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Renaissance and Reformation

me VI (1969-70) Number 1

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Renaissance and Reformation is published three times yearly (September - June) by the University of Toronto Renaissance and Reformation Colloquium and by the Victoria University Centre for Renaissance and Reformation Studies.

Editors (1969-70)

John McClelland
James M. Estes

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F. David Hoeniger (Chairman)
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EDITORS' FOREWORD

In this, their first issue of Renaissance & Reformation, the new editors of the Bulletin wish to pay especial tribute to their predecessors, Natalie Davis and James McConica. Since 1964 their efforts have transformed a three-page newsletter into a respected journal with an international readership. We hope it will continue to flourish and continue to receive the enthusiastic support of its subscribers and contributors.

With a mailing-list now in excess of three hundred, R & R obviously needed a more convenient format and a more permanent typography. Hence the decision to have it produced by photo-offset at the University of Toronto Press. Publication costs have thereby been increased, and although we receive the generous support of the University of Toronto Graduate School and the Victoria University Centre for Renaissance and Reformation Studies, still it has been necessary to raise slightly the subscription price. We apologize.

R & R will continue to be the publication of the Toronto Renaissance and Reformation Colloquium and as such will be primarily "for scholars in the Toronto area." Gradually, however, our horizons are broadening to include material of interest to scholars all across the country and to the international scholarly community. Our focus remains the same: the publicizing of research opportunities and resources in Renaissance and Reformation studies. All contributions which fall into that category will be welcome. As a new feature of the Bulletin, and as a means of increasing contact among scholars, we propose to open a "Queries" column; all suitable scholarly enquiries will be printed.

John McClelland

James M. Estes

ANNOUNCEMENTS

The final 1969-70 meeting of the University of Toronto Renaissance and Reformation Colloquium will take place on the evening of Friday, March 20 and will be held at Victoria College. Professor Hannibal Noce of the Department of Italian and Hispanic Studies and the Graduate Centre for the Study of Drama will speak on Ruzante's Dialoghi in lingua rustica as a prologue to the presentation of the Bilora (in a new translation) by students of the Centre for the Study of Drama.

The annual meeting of the North-Central Renaissance Conference will take place Thursday, May 21 to Saturday, May 23 at the University of Guelph, Guelph, Ontario. Further details from Dean M. H. M. MacKinnon.

CORRECTION

In connection with Germaine Warkentin's article, "Some Renaissance Schoolbooks in the Osborne Collection" (R & R, V, No. 3, p. 10), we have received a letter from Mr. H. C. Campbell, chief librarian of the Toronto Public Library. The following is an excerpt from that letter:

> We regret, however, the inference that our copy of Laurence Vaux's Catechisme or Christian doctrine necessarie for children and ignorante people is the Lincoln Cathedral copy recorded in STC. Mr. Osborne found our copy in the private library of Mr. Humphrey Fitz Roy Newdegate at Arbury Hall, Warwickshire, a country house which originally was a monastery of the Augustinian order founded by Ralph de Sudeley in the reign of Henry II. Mr. Fitz Roy Newdegate gave the book to Mr. Osborne for the Osborne Collection in 1955. ... We are sorry if your article might imply that it was the stolen property of Lincoln Cathedral.

We apologize to Mr. Campbell and the Toronto Public Library for this inadvertent error and regret any inconvenience that may have resulted.

COMMUNICATIONS

Professor Paul Clogan asks us to announce the New Series of Medievalia et Humanistica, studies in Medieval and Renaissance culture, to be published annually by the Press of Case Western Reserve University. The yearly volumes will include articles of "distinguished scholarship, criticism, and review of all aspects of Medieval and Renaissance culture (including art, archaeology, history, law, literature, music, philosophy, science, and social institutions)" and aim to "interrelate the work of Medieval and Renaissance scholars; to review important publications within its field; and to report the progress of Medieval and Renaissance studies in the United States and Canada .. The editorial board welcomes critical, documentary, interdisciplinary, scholarly studies following traditional or new approaches ... Manuscripts prepared in conformity with the MLA style sheet should be addressed to the editor, Paul M. Clogan, Department of English, Case Western Reserve University, Cleveland, Ohio 44106."

The Rev. John J. Alhadef, librarian at Alma College, California, has sent some information concerning the Catholic Microfilm Center, Inc., "a non-profit, tax-exempt educational corporation designed to aid libraries expand their research potentiality in the most effective and economical way possible through the medium of microfilm and through a cooperative sharing of resources." A library may become associated with the Center by paying a yearly fee of $100 and in return receive discounts when purchasing titles already filmed, free loan of microfilmed works, special rates for microfilming new titles, free search for materials to be microfilmed, and the possibility of having microfilming done in most libraries in North America and Europe. Alma College itself has an especially rich collection of 16th-century Italian and Spanish theologians, much of which is already available on microfilm. Further information from Father Alhadef at: Alma College Library, P. O. Box 1248, Los Gatos, California 95030.

CORPUS REFORMATORUM ITALICORUM

More than a decade after a group of scholars conceived the plan of making available critical editions of the writings of Italian participants in the Reformation, the series Corpus Reformatorum Italicorum has been launched. General editors Luigi Firpo and Giorgio Spini, with the collaboration of Antonio Rotondò and John A. Tedeschi, have arranged for the joint publication of the series by G. C. Sansoni Editore of Florence and the Newberry Library of Chicago. The first two titles which have appeared are the Avvertenze ai Collaboratori (1969) and Camillo Renato: Opere, Documenti e Testimonianze, edited by Antonio Rotondò (1968).

As a manual of style for prospective contributors to the series, the Avvertenze provides not only detailed editorial guidelines but also a general view of the aims of the project. In the first place, the scope of the series reflects the conceptual framework sketched by the late Delio Cantimori in his Prospettive di storia ereticale italiana del Cinquecento (Bari, 1960). Italian reformers of all doctrinal persuasions, not just "heretics" defined as "rebels against any form of ecclesiastical communion" (Cantimori's famous earlier formulation), are to be included. The era to be covered runs from the first manifestations of reformed ideas in Italy to the death of Marcantonio De Dominis in 1624, after which time (Cantimori maintained) the religious element per se in the thought of Italian exiles disappeared.

Second, opera omnia in the fullest sense of that term will be made available in these editions. Since the Italian reformers are of historical importance for their role in transmitting Italian Renaissance culture to northern Europe as well as for their religious ideas, their writings on literary and historical subjects (including translations of classical and modern works and commentaries on the classics) will be presented in chronological order along with their religious treatises. When a work appeared in more than one edition or in translation, the variations will be noted; in the case of works which underwent major changes in successive editions, such as the radically different versions of Celio Secondo Curione's Pasquillus exstaticus, each edition will be treated as a separate text. Correspondence, relevant documents, and contemporary reference (testimonianze) will be assembled in order to give as complete as possible a picture of each reformer's life and works.

These volumes will be exclusively devoted to primary materials — that is, they are designed as "works" rather than "life and works." A complementary series, however, will include monographs (a number of which are now being evaluated for possible publication), bibliographies (for example, the comprehensive critical listing of Pietro Martire Vermigli's writings presently being prepared by Robert M. Kingdon), and collections of archival materials (such as important Inquisition records).

Finally, the directors insist that the volumes must be edited according to the most rigorous criteria of modern scholarship. At the foot of each page of text, two types of notes will provide (1) indications of variant readings and possible emendations, and (2) brief identifications of persons mentioned and the sources of quoted or paraphrased passages and phrases. More extensive critical notes at the end of each volume are to be devoted to a discussion of the forms in which each piece exists (manuscript, contemporaneous edition, and/or later edition); to a consideration of the temporal and ideological context of the work, letter, document, or testimonianza; and to a discussion of the present state of knowledge about the reformer.

Rotondò's edition of the writings of and documents pertaining to Camillo Renato (né Paolo Ricci, alias Lisia Fileno) sets a very high standard for the Corpus Reformatorum Italicorum. The works of Renato and supplementary materials which Rotondò has assembled are comparatively few in number: sixteen humanistic carmina (1538-1540); the Apologia, prepared in 1540 for presentation to the Inquisition tribunal at Ferrara; the Trattato del battesimo e della santa cena, composed while Renato was contending with Agostino Mainardi in 1547; the Certa in symbolum professio addressed in 1548 to Frederick von Salis, a potential protector; the Carmen in Ioannem Calvinum, dealing with tthe case of Michael Servetus (1554); twelve letters by Renato to various people and one from Bullinger to him; and eighty documents (letters and passages from letters, fragments of the Inquisitorial judgment against Renato, the opinion of the Zürich pastors solicited by Mainardi in his effort to counteract the pervasive radical influence of Renato, Renato's abjuration made at Chiavenna in 1551, etc.). Of Renato's works, the carmina, the Apologia, and all but the first three pages of the Trattato del battesimo e della santa cena have been transcribed from the original manuscripts and published for the first time by Rotondò, who is a skilled paleographer. The majority of the letters, documents and testimonianze, as Rotondò notes, have appeared in print previously; but he has discovered and added to the Renato corpus sixteen new such pieces of information. Bringing all these writings together in an impeccable critical edition and providing an authoritative commentary on them is obviously a great service to scholarship. But beyond this, Rotondò, by his painstaking search in innumerable Italian and Swiss libraries and archives, has virtually eliminated the likelihood that further information about Renato's career as a radical reformer will come to light.

Camillo Renato provides, as all volumes of the Corpus Reformatorum Italicorum are designed to do, the basic source material for the study of Renato's role in Italian Reformation history. Neophytes who require a narrative account in English of Renato's career will do well to begin with George H. Williams' "Camillo Renato (c. 1500- ? 1575)" in Italian Reformation Studies in Honor of Laelius Socinus (Florence, 1965) and then move on to the important texts which Rotondò has made available.

Forthcoming volumes of the Corpus Reformatorum Italicorum will appear at the rate of approximately two per year, and several have been announced for future publication. Heading this list is Salvatore Caponetto's edition of the Beneficio di Cristo by Benedetto da Mantova, which had an incalculable effect on Italian religious attitudes. Rotondò is preparing a first volume of the works of Giorgio Biandrata, the Antitrinitarian Piedmontese physician. The Sienese Mino Celsi's treatise favoring religious toleration, In haereticis coercendis quatenus progredi, and other writings of Celsi are being edited by Peter Bietenholz. Albano Biondi will make available the philological writings of Celio Secondo Curione, who, after a distinguished academic career in Italy, became a professor at the University of Basel. Treatments similar in format to Camillo Renato will be given to other less prolific but equally important figures. Francesco Pucci, the Florentine Neoplatonic visionary, is being dealt with by Luigi Firpo. Leandro Perini will edit the writings of the Sicilian prophetic advocate of the freedom of the will, Giorgio Siculo. The extremely important traces of the life and work of Lelio Sozzini, the father of Unitarianism, are being assembled for publication by John A. Tedeschi.

Lawrence College, Wisc. Anne Jacobson Schutte

SIXTEENTH AND SEVENTEENTH CENTURY FRANCE IN SASKATCHEWAN

The Murray Memorial Library of the University of Saskatchewan at Saskatoon is best known among historians for its collection of Canadiana. However, over the years a large number of books concerned with French history have been assembled. The collection is far from being complete in any area but a significant body of material has been gathered for the Revolutionary and Napoleonic period and for the sixteenth and seventeenth centuries. The purpose of these comments is to give some idea of the holdings of the University of Saskatchewan library in the latter field, specifically in the period from the beginning of the Wars of Religion to the death of Louis XIV.

A general picture of the holdings of Murray Memorial Library may be gathered from the fact that the library possesses the greatest part of the books discussed in William F. Church, "Publications on Cardinal Richelieu since 1945: a Bibliographical Study," Journal of Modern History, XXXVII (1965), 421-444; and in John B. Wolf, "The Reign of Louis XIV: A selected Bibliography of writings since the war of 1914-1918," Journal of Modern History, XXXVI (1964), 127-144. If a similar article were written on the Wars of Religion the same statement could be made.

In addition to these recent works there is an uneven collection of older secondary works. The most important books in this category are continually being added to the library as they become available either on the second hand market or in reprint. Some recent examples in this area are Haag and Haag, La France Protestante, 10 vols. (reprint Geneva, 1966); L. Guerin, Histoire maritime de France, 2 vols. (Paris, 1843-1863); A. Roncière, Histoire de la Marine Française, 6 vols. (Paris, 1909-1932). Some of the multi-volume sets such as Berthold Zeller's on France in the first quarter of the seventeenth century are as yet incomplete.

The library houses most of the standard printed collections of sources such as Michaud and Poujoulat's collection of memoirs, the correspondence of Catherine de Médicis, Henry III, Henry IV, Richelieu, Mazarin, Colbert, Bossuet, Sevigné, Louis XIV, Isambert's collection of laws, and Depping's collection of administrative correspondence. The reprinted publications of the Société de l'histoire de France are present in their entirety; but the large sets of the Collection des Documents inédits sur l'histoire de la France series and the Histoire Générale de Paris are as yet incomplete.

These standard items are supplemented by more unusual holdings such as printed (not microform) editions of the Mercure de France and Archives curieuses de l'histoire de France, seventeenth and eighteenth century editions of memoirs, lives of Louis XIV, and diplomatic histories. There is also the nucleus of a collection of royal ordinances and codifications of local laws.

Finally on microfilm the library has a large number of pamphlets and diplomatic correspondence. The latter is a unique collection in North America.

In related areas the standard editions of the complete works of all important and many minor literary figures are present from Villon and Rabelais through Bellay and Ronsard to Urfé and Balzac and on to Molière, Fénelon and Bayle. Many of the standard works of religious history are available such as Hurter's Nomenclator literarius theologiae catholicae, Tassin's Histoire littéraire de la congrégation de Saint Maur, Cherest's Matricula

religiosorum professorum ... Congregationis Sanctorum Vitane et Hydulphi, and Holstenius', Codex Regularum. Gremond and Sainte Beuve are of course present. The many volumes of documents collected by Lucien Ceyssens along with the above works and the complete works of Antoine Arnauld (43 volumes) make Jansenism one of the best covered subjects in the period. There is even a "do it yourself" book for inquisitors, Tractatus de officio sanctissimæ inquisitionis et modo procedende in causis fidei ... Cremona, 1642.

French local history is an area that is beginning to be developed. At present there are fair collections for Normandy and for Paris. Two areas of Parisian history in particular are being developed, social and religious. This is exemplified by such works as Roland Delachenal, Histoire des avocats au Parlement de Paris, 1300-1600, (Paris, 1885) and Pierre Feret, La faculté de théologie de Paris et ses docteurs les plus célèbres: Epoque moderne (XVI, XVII, XVIII siècles), 7 vols. (Paris, 1900-1910). These and other volumes of a a similar nature in addition to the Histoire générale de Paris mark a good beginning for this section.

Beyond France the library has excellent holdings for the study of Prussia during the reign of the Great Elector (1640-1688). Many of the standard source collections for English history as well as a growing number of North American sources are also available for the sixteenth and seventeenth centuries.

To return to France, the library has a good selection of national historical journals including XVIIe siècle as well as two specialized journals Annales de Normandie and Revue d'histoire de l'église de France. The holdings of the latter journal begin with the first volume. All of the standard bibliographical aids are present from Bibliographie annuelle de l'histoire de la France to Hauser, Bourgeois and André, Cioranescu and Franklin. Also available are many aids for literary history such as L. C. Lancaster's nine volume French Dramatic Literature in the Seventeenth Century, Barbier's Dictionnaire des ouvrages anonymes, Grente's Dictionnaires des lettres françaises as well as the available volumes of Dictionnaire de Biographie Française. The catalogues of the Bibliothèque Nationale and the British Museum are among other general aids present in the library.

If the field of sixteenth and seventeenth century French history is subdivided by period and by topic the following pattern becomes apparent. For the first half of the sixteenth century there are scattered sources available; the fields covered best are administrative, religious and Parisian history. For the period of the Wars of Religion there is a good range of secondary material and a fair number of primary sources. The strongest areas are the origins of the wars and economic and social history. The best material for the reign of Henry IV is in the areas of diplomatic and administrative studies. The period from the death of Henry IV in 1610 to the coming of the power of Richelieu in 1624 is the timespan with the best original sources; most areas are covered in fair depth, outstanding are the fields of administrative, economic and social history and public opinion. The part of the reign of Louis XIII dominated by Richelieu is perhaps the second best covered field; the one major difference is that there is much less material for the study of diplomatic history, though there is more on religious history.

The reign of Louis XIV can be divided into three parts. For the period of Mazarin the holdings of the library include the standard sources and administrative history is the area best covered. For the thirty years after 1661

religious, social, diplomatic and administrative history are all fairly well covered. The library holdings for the last twenty-five years of the reign of Louis XIV are strongest in the fields of social, diplomatic and administrative history. Throughout the whole of the two centuries there are numerous possibilities for research in intellectual and literary history.

With a general idea of the holdings in mind we can proceed to look at the areas within the broader field in which the library of the University of Saskatchewan is particularly strong. In each case specific mention will be made only of the most noteworthy volumes.

Diplomatic history is one area of great strength. Here the most important holdings are on microfilm. The library has copies of ten volumes from the Archives d'Affaires Etrangères, fifteen volumes from the Bibliothèque Nationale, seven volumes from the Archives nationales, all in Paris; seven volumes from the Archivo di Stato in Florence; five volumes from the Archivo Segretto Vaticano; and four volumes from the British Museum. Together these volumes of diplomatic correspondence and instructions form a unique collection for the study of the diplomatic history of France during the first quarter of the seventeenth century. This collection continues to expand. At present French relations with England, Spain, Rome and the Ottoman Empire are covered best, as are the relations of England, Spain, Rome and Tuscany with France. Some material for the Holy Roman Empire, the German Princes, Holland, Savoy and Venice are also included.

The microfilm holdings are complemented by many printed collections of diplomatic correspondence including those of the Venetian and Tuscan ambassadors in the sixteenth century, Alexandre Teulet, Relation politique de la France et de l'Espagne avec l'Ecosse aux XVIe siècle (Paris, 1862), the correspondence of Fourquevaux, Du Perron, Ossat, Bongars and Estrades among others.

Finally the library has a group of books of the late seventeenth and early eighteenth centuries dealing with the wars of Louis XIV, for example, Mémoires et négociations secrètes de la France touchant la paix de Munster ... (Amsterdam, 1710); La conduite de la France depuis la paix de Nimegue, (Cologne, 1683); Actes et Mémoires des négociations de la Paix de Ryswick, 4 vols., (La Haye, 1699). More general books in the same area include M. de Massiac, Faits mémorables des guerres et des révolutions de l'Europe ... 1627 jusqu'en 1721, (Toulouse, 1721) and E. Bruneau, Estat présent des affaires d'Allemagne ... (Paris, 1675).

While the library has only fifteen French political pamphlets in their original form (1587 - 1631, especially 1610 to 1617), it does have 220 others others on microfilm. This microfilm collection, drawn from Newberry Library, the Bibliothèque Nationale, the British Museum and the Archivo di Stato in Florence, is strongest for the years 1610 to 1619 and especially 1614-1615 but reaches from 1576 to 1634. The subjects treated in these pamphlets are most importantly, the Estates General, finances, public opinion, sorcery and foreign policy.

This collection is complemented not only by the Mercure de France and by the source collections mentioned earlier, but also by such works as a 1614 edition of Jacques de Thou's history by Mathieu deMorgues, Diverses pièces pour la defense de la Royne Mere du Roy tres chrestien Louys XIII, 2 vols. (Anvers, 1637); Le theatre universel des princes ou histoire generale ..

(Paris, 1613); Recueil des pieces les plus curieuses qui ont esté faites pendant la regne du connestable M. de Luynes (n.p., 1625); Simon Goulart, Le quatriesme receuil ... histoire des choses plus memorables ... (n.p., 1595).

Among the individually published memoirs available in Murray Memorial Library two groups are particularly interesting: 1. those of which there are several editions spread over four centuries, for example Queen Marguerite, L'Estoile, Sully, Richelieu, Bassompierre, Retz, Choisy, La Fare, Condé, Saint Simon. 2. Those memoirs which are not available in standard collections such as those of Vauban, Turenne, Fouquet, Villars and Chavagnac. In addition there are assorted seventeenth and eighteenth century works of varying value such as Des Maizeaux, La vie de Monsieur Boileau Despreaux (Amsterdam, 1712); La véritable vie d'Anne Geneviève de Bourbon, duchesse de Longueville (Amsterdam, 1739); Discours merveilleux de la vie, actions et deportemens de Catherine de Médicis ... (selon la copie imprimé à Paris, 1649); Lettres historiques de Monsieur Pellisson, 3 vols. (Paris, 1729); Les amusens de l'amitie rendus utiles et enteressans. Receuil de lettres ecrites de la cour vers la fin du regne de Louis XIV (Amsterdam, 1729).

Related to the above category of works are assorted contemporary or semi-contemporary histories. Particularly interesting here are a series of books that were written in or translated into English: James Howell, Lustra Ludovici or the Life of the Late Victorious King of France Lewis the XIII ... (London, 1646); Vassor, The History of the Reign of Lewis XIII, 2 vols. (London, 1700-1701); Benjamin Priolo, The History of France under the Ministry of Cardinal Mazarine (London, 1671); Lord Arundel, Monsieur Colbert's Ghost or France without Bounds (Cologne, 1684). Books of this nature along with translations of Franco-Gallia (1711 for example), others like An Account of the Persecutions and Oppressions of the Protestants in France (n.p. 1686) and the translations of the memoirs of Montluc, Sully, Richelieu and others available open the way for a study of English opinions of France in the sixteenth and seventeenth centuries.

The last major area of concentration is the general one of laws and ordinances. In addition to the works of men like Guy Coquille and Antoine Loysel the library has Georges Louet, Receuil d'aucuns notables arrests donnez en le Parlement de Paris, (Paris, 1614). Ordonnance du Roy Louis XIII ... 1629 (Toulouse, 1630); Ordonnance de Louis XIV roy de France et de Navarre pour le commerce ... 1673 (Paris, 1762); Ordonnance de Louis XIV roy de France et Navarre du mois de may 1680 portant reglement sur le fait des gabelles ... (Paris, 1734); Ordonnance de son Altesse royale pour l'administration de la justice ... 1707 (Nancy, 1725). As a complement to these the library has: Coustume du bailliage de Troyes avec les commentaires de M. Louis le Grand (Paris, 1681); Coutume generale des pays et duché de de Bourgogne avec le commentaire de Monsieur Raisand (Dijon, 1698); Coutume du pays et duché de Normandie (Rouen, 1700).

When the holdings of the library have been carefully sifted (and such topics as economic history added — the library has most of the modern works and several early ones such as Forbonnais) it becomes apparent that Newberry Library need not panic yet. At the same time it is evident that there are other things in Saskatchewan than siwashes and mukluks.

In practical terms Murray Memorial Library can support honours and graduate seminars in most areas of French history from the mid-sixteenth through the seventeenth century. With some reliance on the good will of other

libraries through interlibrary loans, Master's Theses can be prepared by Saskatchewan students in a number of fields, particularly Jansenist studies, diplomatic and literary history and selected areas of administrative, social and religious history. In a few carefully selected areas, especially French diplomatic history in the first quarter of the seventeenth century, a Ph.D. candidate could get a decent start on his work before he set off for France.

Plans are now underway to utilize the available library resources in a new way. The three seventeenth century specialists in the History Department at Saskatoon (France, England, North America) plan to offer a seminar in trans-Atlantic seventeenth century studies. The interests of the men involved and the library resources available mesh and it is hoped that the result will be a study of the intellectual-institutional-social history of the Atlantic countries in the seventeenth century; in other words a study of the different ways in which the same things were done.

University of Saskatchewan,
Saskatoon

J. Michael Hayden

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BOOKS OF 'MATERIA MEDICA' IN TORONTO LIBRARIES:[1]

Herbals, Books of Simples and Compounds, Formularies, Pharmacopoeias, Etc. 300 B.C. to 1800 A.D.

by Roberta Styran & Andrew Watson

The vast and ancient literature of medical remedies is of interest to scholars from a wide range of disciplines for the light it throws on many obscure areas. It is of primary concern, of course, to historians of medicine and pharmacy who may find here a large part of the story of therapeutics. But it is also of more than passing interest to many other scholars: to historians of science in general, who may trace in the growing number of cures man's expanding knowledge of all three Kingdoms of the natural world; to the historian of botany in particular, who for most periods of history will find here the main source of information about the plants that were known, the diffusion of plants, and scientists' deepening understanding of plant morphology; to economic historians, for the extensive information which can be gleaned about the spread of medical crops, as well as about the traffic in materia medica; to historians of labour, who will find here much of the story of the uneasy alliance that existed from the earliest times between the related professions of doctor and pharmacist, and the stages by which the modern professions evolved; to the historian of disease, who can learn from such writings much about what diseases afflicted our ancestors or what these diseases were imagined to be; to the historian of art, who will find many of the works in this literature copiously illustrated — indeed for a few periods herbals offer one of the principal surviving examples of the art of an age; to historians of magic, witchcraft, superstition, and folklore; and finally to historians of philology, lexicography, and calligraphy, for whom certain parts of this literature are fundamental.

Although there is no single collection of this literature in Toronto which is outstanding, the combined resources of Toronto libraries include all the principal works, and for certain periods the amount of research material available is impressive. This article will survey the holdings of Toronto libraries of this literature from its beginnings until the later part of the eighteenth century. Such a long sweep seemed necessary since so many of the publications of the Renaissance in this field were editions, translations, or adaptations of ancient and mediaeval works, or were in the same vein. It was only towards the end of the Renaissance, as will be seen, that a break with tradition occurred.

1. The Ancient World

Few of the works of classical antiquity on medical botany have survived — only six of note — but these were of such quality that they established a

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[1] The following symbols are used to show the location of books: UT (University of Toronto, Main Library); UTRB (University of Toronto, Rare Books Department); UTPh (University of Toronto, Faculty of Pharmacy Library); AM (Academy of Medicine); PIMS (Library of the Pontifical Institute of Mediaeval Studies); TPL (Toronto Public Library); ROM (Library of the Royal Ontario Museum). X indicates book which is on order; NAT a book which is not available in Toronto.

tradition followed in both Europe and the Arab world through the Middle Ages and into modern times. The earliest writer in this field, Theophrastus of Eresos (c. 372-c. 288 B.C.), was a pupil of both Plato and Aristotle, succeeded Aristotle as head of the Lyceum, and inherited his library and garden. In the best edition of his Opera omnia, ed. Fr. Wimmer (Paris: Didot, 1886) (UTX, reprint), is to be found a critical edition of his Historia plantarum and his De causis plantarum based on all existing manuscripts, as well as a new Latin translation of these works and an index of the botanical names of plants mentioned. Wimmer's Greek text is reproduced with an English translation in an edition by Sir Arthur Hort (London: Heinemann, 1916) (UT, TPL). Theophrastus mentions some 400 plants (a present-day Flora of Greece lists about 3,000 but includes many which were not found in ancient Greece). Most of these plants were known in Greece or the Levant; but a number of Asian plants are described, such as cotton, the banyan tree, banana trees, the mangrove, and the Indian fig tree, all of which had probably become known to the Greeks through the voyage of Admiral Nearchos into the Persian Gulf in the year 325 B.C.[1] In describing and classifying these plants, Theophrastus set high standards which those who came after him seldom attained. His account of the medical properties of plants, however, seems based largely on folklore of the time.

Following Theophrastus, the next important compiler of materia medica was Pedanios Dioscorides of Anazarbos (fl. mid-1st cent. A.D.). Primarily a botanist rather than a physician, Dioscorides describes about 600 plants and a smaller number of animal and mineral substances, all of which were believed to have medical properties and a considerable number of which were not to be found in his native region of Cilicia. His work is the high point of ancient medical botany and was the principal reference for most mediaeval writers in both the Christian and Arab worlds. The best edition of the Greek text is De materia medica libri quinque, ed. M. Wellmann (Berlin: Weidmann, 1907-14) (UT reprint). Latin translations, apart from those of the Renaissance (q.v. infra), are found in De materia medica ..., ed. K. Sprengel (Leipzig: Cnobloch, 1829-30) (UT) and De materia medica ..., ed. M. Wellmann (Berlin: Weidmann, 1958) (UT), of which the latter is superior.

Two contemporaries of Dioscorides, both Latins, also made important contributions to this literature: Celsus (fl. early-1st cent. A.D.) and Pliny the Elder or Gaius Plinius Secundus (23-79 A.D.). The De medicina of Celsus, whose works on other subjects have perished, contains much information about materia medica, which is conveniently collected in the second volume of the edition and English translation by W. G. Spencer (London: Heinemann, 1960-1) (UT, PIMS). Mediaeval scholars, however, were not familiar with this work, which was rediscovered only in the fifteenth century. Pliny's enormous Naturalis historia, though lacking in originality and often uncritical, is the greatest ancient compendium of knowledge and beliefs about the natural world. Books XX to XXXIV contain his accounts of the properties of drugs of animal, mineral and vegetable origin, and list more materia medica than is to be found in any other ancient work. There are many editions of this work available in Toronto, including early-modern editions (q.v. infra).

A more rigorous framework to the writings on medical remedies was given by Galen of Pergamum (129-199 A.D.), "the greatest physician of antiquity after Hippocrates." Galen developed the Hippocratic idea of the four humours into a rigid system which dominated pathology and therapy for over 1,500 years. According to this theory, illness was caused by an imbalance of

[1] H. Bretzl, Botanische Forschungen des Alexanderzuges, Leipzig, 1903.

the humours of the body, which took the form of excessive dryness or moisture, heat or cold. This could be rectified by the application of medicines with the opposite qualities: herbs known to be essentially cool, for instance, like nenufar, could be used to counteract fevers, provided the potency of the drug was commensurate with the disease. As virtually all plants and many other substances could be shown to be dry or wet, hot or cold, medical uses could be found for an enormous range of materials from the animal, vegetable and mineral kingdoms. It was the work of later centuries to identify all the possible applications of the materials found in the natural world, as well as of combinations of these materials concocted by man. Galen's Opera omnia are available in an edition by C. G. Kühn (Leipzig: Cnobloch, 1821-33) 20 vols. in 22 (UT, AM), as well as in various volumes of the Corpus medicorum Graecorum (Leipzig: Teubner, 1908-) (UT).

Finally, two late-classical authors had an important influence on the medical lore of the Middle Ages: Apuleius Platonicus or Barbarus (Pseudo-Apuleius) (prob. fl. 5th cent.) and Marcellus Empiricus (fl. c. 410). The Herbarium of Apuleius, based on Dioscorides and Pliny, was one of the principal herbals of the Middle Ages. A facsimile edition of the Vienna manuscript of this work is being prepared and will appear under the title Antike Medizin (Codex Vindobonensis 93) (Graz: ADV, 1970) (UTX). This manuscript, apparently a copy of a sixth-century Italian manuscript, has many illustrations which are reproduced in colour; it is also of interest because it contains several other ancient works on medicine and Dioscorides' treatise on female plants. In the De medicina of Marcellus Empiricus, who was born in Bordeaux, is to be found an extraordinary mixture of traditional medicine and popular, probably Celtic, lore; a very large number of plants is mentioned. This work is available in an edition by Pieter Burmann (Leyden: C. Wishoff & D. Goedval, 1731) (UTRB).

2. The Arab World to 1300

Arab pharmaceutical literature may be said to begin with the translation into Arabic of the works of Dioscorides and Galen, which established the tradition that was followed by all later Arab writers. The greater part of the Materia medica of Dioscorides was translated into Syriac and Arabic by the Nestorians Ḥunain ben Isḥāq and Isṭifān ibn Basīl after the middle of the ninth century, though the exact role of the two scholars is difficult to determine. This translation appears to have been revised by a Persian scholar in 985 and became perhaps the principal authority for Arabic pharmacy. This Arabic text is given in La 'Materia médica' de Dioscorides, ed. Cesar Dubler & Elias Terès (Barcelona: Tip. Emporium, 1952-7), Vol. 2 (UTX). Another Arabic translation was made in Spain after the middle of the tenth century, from a magnificent manuscript of the work sent by the Byzantine Emperor Constantine VII as a gift to the Caliph 'Abd al-Raḥmān III of Spain. As Spanish scholars were unable to understand the Greek text, the Emperor was asked to send a scholar who could explain it. A monk, Nicholas, was soon dispatched, and with his help another Arabic translation was at last produced by Ḥasdai ibn Shaprut, physician to the Caliph.

Many of the works of Galen were translated into Syriac and Arabic in the later part of the ninth century by Hubaish ibn al Ḥasan, son-in-law and pupil of Ḥunain ben Isḥāq, the translator of Dioscorides. Some of the Arabic text of Galen's works is available with an English translation in Galen on Medical Experience, ed. & tr. R. Walzer (London: Oxford UP, 1944) (UT).

Like nearly all the other great scholars of the early centuries of Islam, the early Arab authors of works on medical remedies were natives of the eastern reaches of the Arab world — of Syria, Iraq, and Persia. The founder of Arabic medical botany, for instance, was a Persian contemporary of Ḥunain ibn Isḥāq, by the name of Abu Ḥanīfa al-Dīnawārī (d. c. 895). He was concerned to a large extent with philological problems, especially with the meaning of the names of plants used by Greek and pre-Islamic Arabic authors, as well as those mentioned in the Koran; he was only secondarily interested in the plants themselves. In spite of its narrow scope, the work was quoted by virtually all Arabic philologists, lexicographers, agronomes, pharmacists and botanists until the eighteenth century. The complete text of the Kitāb al-Nabāt has been lost, but an attempt to reconstruct it may be seen in B. Silberberg, "Das Pflanzenbuch des Abū Ḥanīfa al-Dīnawārī", Zeitschrift für Assyriologie, XXIV-XXV (1910-1911) (UT). More recently, however, two fragments of the text were discovered, one in Medina and one in Istanbul; and other parts of the work seem to have turned up in the libraries of Yale University and the Arab League. The text of the Istanbul manuscript is published in The Book of Plants of Abū Ḥanīfa ad-Dīnawārī, ed. B. Lewin (Uppsala: Lundequistska, 1953) (NAT). This fragment comprises about one-third of the alphabetical listing of plants.

Al-Rāzi (c. 865-c. 932), or Rhazes, as he was known in Europe, has been described as "the greatest clinician of the Middle Ages." His enormous encyclopedia of medicine, Kitāb al-ḥawī fīl ṭibb, known as the "Continens" in Europe, has been edited from the Escorial manuscript (Hyderabad/Deccan: Osmania, 1955-64), 17 vols. (UT). It is also available in several early Latin translations (v. infra).

Another encyclopedic work, which was to have still greater influence in both East and West, was Al-qānūn fī al-ṭibb of Ibn Sīna or Avicenna (980 ?-1037). There were several early-modern editions of this work in Latin (v. infra). The Canon of Medicine of Avicenna, ed. O. C. Gruner, (London: Luzac, 1930) (UT) gives an English translation of Book I of this work, while the text is found in Kanon varchebnoĭ nauki (Tashkent: Uzbek Academy of Sciences, 1954-60) 5 vols. (UT). In spite of its impressive scope and its undoubted influence, however, the section on materia medica is considered to make little in the way of a new contribution, being derived largely from other authors.

With the death of one other great scholar of the Eastern reaches of the Arabic world, Al-Bīrūnī (973 ?-1048) (whose important work on pharmacy, Al-saidanah fī al-ṭibb, does not appear to have been published), the great flowering of Arabic medicine in the East was over, and only one other Eastern work need be mentioned, The Medical Formulary of Al-Samarqandī (d. 1222), tr. M. Levey and Noury al-Khaledy (Philadelphia: University of Pennsylvania, 1967) (UT). By the eleventh century, the leadership in medicine, as in most fields of scholarship, was passing to Muslim Spain. The first important Spanish writer on medical botany was Ibn Wafid or Abenguefit (c. 997-1074), who spent twenty years writing his book of simples, which was translated into Latin in the twelfth century and into Catalan in the fourteenth century. The Catalan version has been published as El "libre de les medicines particulars" Versión catalana del texto árabe, ed. L. Faraudo de Saint Germain (Barcelona: Diputación, 1943) (NAT). The Book of Plants and Trees of Al-Bekri (d. 1094), a great naturalist and geographer, has unfortunately been lost, but part of the treatise on pharmacology of another Maghrebi naturalist-geographer, Al-Idrīsī (1100-66), has recently been discovered in Istanbul. Al-Idrīsī, who flourished at the Norman court in Sicily, describes 610 plants mostly from personal observation; his account of the medical properties of the plants, however, is

thought to be based entirely on other authors. Al-Kulliyāt of Ibn Rushd, or Averroes, (d. 1199) has been edited from the unique manuscript (Larache, Morocco: Bosca, 1939) (NAT) and is also to be had in an early Latin translation (v. infra). Another Spanish doctor of great fame, Mūsā ben Maimūn, or Maimonides (1135-1204), left Spain while still very young, after the Almohad conquerors began persecuting the Jews, and finally settled in Cairo, where he became physician to Saladin. His Glossaire de matière médicale, ed. & tr. Max Meyerhof (Cairo: Institut Français, 1940) (UT), one of eleven books he wrote on medicine, is considered to be highly original. An abridgement of the book of simples of Al-Ghāfiqī (d. 1165) made by Gregorius Abū al-Faraj (or Barhebraeus) was partly edited and translated from the Cairo manuscript in The Abridged Version of the "Book of Simple Drugs", ed. Max Meyerhof and G. P. Sobhy (Cairo: Egyptian University, 1932) (UT). Publication was discontinued, however, when two manuscripts of the first half of the complete work were discovered, one of them in the library which Sir William Osler bequeathed to McGill University; this manuscript, beautifully written and illustrated, was probably made in Baghdad towards the middle of the thirteenth century. Finally, the culmination of Hispano-Arab botany was reached with Ibn al-Baiṭār of Malaga (c. 1147-1248), who became chief botanist to the Sultan in Cairo. His Traité de simples, ed. & tr. L. Leclerc (Paris: Imp. Nat., 1877-1883) 3 vols. (NAT) deals with about 1400 simple medicines, of which about 300 were new. Ibn al-Baiṭār's book was written too late for the great period of translation of Arab works into Latin and other European languages, and hence remained almost unknown in the West until the nineteenth century. The book must be regarded, however, as the summa of Arab pharmaceutical literature.

3. Mediaeval Europe

A. Mediaeval Manuscripts of Classical Works

In Europe, as in the Arab world, the influence of the authors of antiquity remained strong through the Middle Ages. Although independent approaches to medical botany based on folk medicine can occasionally be glimpsed in the literature, classical works remained the ultimate authorities.

Many mediaeval manuscripts of ancient works about materia medica have survived, but few have been published. One of these, a Byzantine manuscript of Dioscorides' Materia medica, made c. 512 for a lady of high rank, has been reproduced twice in facsimile: Codex Aniciae Julianae picturis illustratus nunc Vindobonensis Med. Gr. I, ed. J. de Karabacek (Leyden: Sijthoff, 1906) (UTRB) and Der Wiener Dioskurides (Graz: ADV, 1965) (UTX). Formerly located in Vienna and now in St. Mark's in Venice, this manuscript is of great importance to historians of Byzantine art on account of its 87 illustrations. The earlier edition contains important introductions on the paleography and illustrations of the manuscript, but reproduces the illuminations in black and white; the second edition, made after a restoration of the manuscript, is entirely in colour.

Several Anglo-Saxon medical manuscripts have also survived, a good number of which are translations of the works of classical authors. The text of one of these, which appears to have been made c. 1050, has been published with a translation into English in Leechdoms, Wortcunning and Starcraft of Early England, ed. O. Cockayne (London: Longman, 1864) vol. 1 (UT). This

manuscript includes the Herbarium of Apuleius and a continuation of excerpts from Dioscorides.

B. Mediaeval Encyclopedic Works

The medical lore of the Middle Ages is also to be found in encyclopedic works which covered a great many different branches of knowledge. Although their authors could not be expected to carry out original investigations in many of the areas upon which they wrote, and were perhaps not inclined to do so, these works are not merely compilations from classical works. In the later ones at least can be found new ideas, almost all erroneous, about the medical uses of plants and minerals, some of which must have derived from popular medicine. These later works also show a greater interest in the plants which were available in Northern and Western Europe; there is less emphasis on exotic drugs which, until the revival of trade with the East, were hard to come by.

The first of these mediaeval encyclopedias was the Etymologiarum sive originum of Isidore of Seville, probably written between 622 and 633, which served as a model for later similar works. The best text of this work is to be found in his Opera omnia, ed. F. Arevala (Rome, 1797-1803) (PIMS), which is reprinted in Patrologiae cursus completus. Series latina LXXXI-LXXXIV (UT, PIMS). A number of other translations and editions are also available (UT, PIMS). Chapter 4 of his encyclopedia, on medicine, and Chapter 17, on agricultural plants, contain what little pharmaceutical knowledge St. Isidore had to offer; compared to what can be found in the writings of the ancients, it is meagre indeed. An English translation of the medical writings is also available in Isidore of Seville, the Medical Writings, tr. W. Sharpe (Philadelphia: American Philosophical Society, 1964) (PIMS).

Two thirteenth-century authors of encyclopedic works also devote important sections to materia medica — Albertus Magnus (1193?-1280) and Vincent de Beauvais (d.c. 1264). The medical and botanical writings of Albertus are found scattered through a number of sections of different works, all collected in his Opera omnia, 38 vols. (Paris: L. Vives, 1890-99) (PIMS). In the Speculum maius of Vincent de Beauvais [1], whose purpose was to reflect "all things of all times", the section on natural history contains 32 books divided into 3,718 chapters, dealing with nearly every aspect of the natural world as it was then understood. Although the book contains little or nothing that was original, and was in many respects out of touch with the more advanced learning of the time, it is a good reflection of the knowledge that was available in well stocked libraries. This encyclopedia is published in Vincent's Opera (Venice: H. Leichtenstein, 1494) (PIMS) and in Speculum quadruplex 4 vols. (Graz: ADV, 1964-5) (PIMS), which is a reprint of the edition of 1624.

C. Mediaeval Leachbooks, Herbals, Etc.

With the decline of surgical knowledge, the application of simples, supplemented by magic and witchcraft, became the main method of treatment of illness, and the information available in general works was by no means sufficient for medical practitioners or even for people wishing to treat

[1] I am grateful to Father J. A. Weisheipl for drawing my attention to this work. — A.W.

themselves. Quite early, therefore, there appeared specialized works containing detailed information about these uses of large numbers of specifics, most of which were available locally. These works drew partly on classical tradition and partly on folk medicine, though about the latter little is known.

Two of the earliest of these were Anglo-Saxon: Bald's Leechbook and the Lacnunga. The manuscript of the Leechbook, which dates from the middle of the 10th century, is reproduced in Early English Manuscripts in Facsimile V (Copenhagen: Rosenkilde & Bagger, 1955) (UT) and the text and a translation are found in Leechdoms, Wortcunning ... op cit. II (UT). The text and a translation of the Lacnunga, taken from an eleventh-century manuscript, have been published twice: in Leechdoms, Wortcunning ..., op. cit. III (UT), and more recently in J. H. G. Grattan & Charles Singer, Anglo-Saxon Magic and Medicine (London: OUP, 1952) (UT). Leechdoms, Wortcunning ..., op. cit., also contains the texts and translations of a number of shorter Anglo-Saxon medical works.

The Macer floridus, attributed to Odo of Meung (fl. late-11th cent.), is one of the earliest continental herbals and was one of the main sources for nearly all subsequent mediaeval herbals. It is written in the form of a poem which describes in 2,269 hexameters the medical properties of 77 herbs and roots. In it may be seen some influence of Arabic work, which was becoming known through the translations of Constantine the African. A mediaeval translation into English of the Macer floridus available in A Middle-English translation of Macer Floridus 'De viribus herbarium', ed. Gösta Frisk (Uppsala: Almqvist & Wiksell, 1949) (UT). Only slightly later than the Macer Floridus are the works of St. Hildegard of Bingen (1098 ?-1178), "the earliest medical writer of Germany and one of the most original personalities of mediaeval times." St. Hildegard was familiar with both classical and popular medicine, and gives the names of hundreds of medical plants in the German vernacular. Her medical work is available in translation in Heilkunde, das Buch von dem Grund und Wesen der Heilkunde der Krankheiten, tr. H. Schipperges (Salzburg: O. Müller, 1957) (PIMS).

Of the later mediaeval herbals there is a good representation in Toronto. The principal of these are the thirteenth-century Italian Herbal of Rufinus, ed. F. Benjamin and Lynn Thorndike (Chicago: Univ. of Chicago, 1946) (UT), which shows, perhaps in reflection of growing Italian trade with the Arabs, a greater knowledge of eastern drugs than any other mediaeval herbal; L'herbier de Moudon. Un recueil de recettes médicinales de la fin du 14e siècle, ed. P. Aebischer & E. Olivier (Aarau: Société Suisse d'Histoire de la Médecine, 1938) (UT); Konrad von Megenberg, Das Buch der Natur (Hildesheim: Olms, 1962) (UT), which is a translation into German made in 1349-50 from the De natura rerum of Thomas de Cantimpré (written c. 1230-44) and is the first work on natural history in the German language; Boec van Medicinen in Dietsche. Een middelnederlandse Compilatie van medisch-farmaceutische Literatur, ed. W. F. Daens (Leyden: Brill, 1967) (UT); Aus mittelenglischen Medizintexten, ed. Gottfried Müller (Leipzig: B. Tauchnitz, 1929) (UT), which is a mediaeval compilation found in Stockholm Misc. Codex X90; Das Asanger Aderlass-und Rezeptbüchlein, ed. G. Eis and W. Schmitt (Stuttgart: Wissenschaftliche Verlagsgesellschaft, 1967) (UT), a Bohemian herbal from the late-fifteenth century, which gives a good picture of medical practice of the time; Recettes médicales, alchimiques et astrologiques du XVe siècle en langue vulgaire des Pyrénées, ed. C. Brunel (Toulouse: Privat, 1956) (UT), which contains six small medical works in Gascon, Catalan, and Pyrenean, all found in a single manuscript; Ein Stockholmer mittelniederdeutsches Arzneibuch, ed.

A. Lindgren (Stockholm: Almqvist & Wicksell, 1967) (UT); A Leechbook, or Collection of Medical Recipes of the Fifteenth Century, ed. W. R. Dawson (London: MacMillan, 1934) (UT); Ein Mittelenglisches Medizinbuch, ed. F. Heinrich (Halle a. S: Niemeyer, 1896) (UT), which is a compilation from various late-mediaeval manuscripts; and Liber de diversis medicinis, ed. M. S. Ogden (London: Oxford U.P., 1938) (UT), which is the text of a manuscript probably made between 1422 and 1454, written mostly in Middle English but with occasional passages in Latin.

4. The Renaissance: Publications of a Traditional Character

With the invention of the printing press came a flood of publications of 'materia medica': editions of classical and mediaeval authors in the original or in translation, versions of Arabic authors, and new works in a traditional vein, all of which will be discussed in this Section. Almost at the same time, however, there began to appear works which adopted a more critical approach to the problem of medication, attempting to eliminate from formularies medicines which could not be demonstrated to be effective. This literature — some of it officially sponsored by cities and states and some written by leading scientists — will be described in the following section.

A. Editions of the Works of Classical Writers

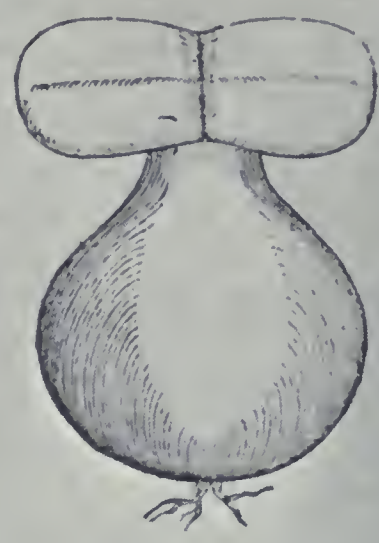
Of the early-modern editions of Theophrastus, the Latin translation of Theodore Gaza of 1483, first printed in 1495-8, is of special interest since it was made from a manuscript different from any now known. We have a later edition of this translation: Habentur hoc volumine haec Theodoro Gaza interprete Theophrasti De historia plantarum libri ix, ... (Leyden: B. de B. de Gabiano, 1505?) (UTRB). There is also a Greek edition with Latin translation edited by Joannes Badeus à Staple, De historia plantarum libri decem, graecè & latinè, ... (Amsterdam: H. Laurentius, 1644) (UTRB), which has the distinction of being called by Schneider "editio omnium pessima."

The editio princeps of Dioscorides was published in 1478 in Latin and was followed by several other editions and translations, including De medicinale materia libri sex, Joanne Ruellio suessionensi interprete, ... (Frankfurt: C. Egenolphus, 1543) (AM); and idem (Lyons: J. & F. Frellonius, 1546) (AM). The best of the early-modern editions, however, is Pedacii Dioscoridis Anzarbius opera que extant omnia ex nova interpretatione Jani-Antonii Saraceni, ... (Lyons: heirs of A. Wechel et al., 1598) (UTRB). Two early translations into vernacular languages are also available: that of Andrés de Laguna into Castillian, first published in 1555, is reprinted in a facsimile of the Salamanca edition of 1570, with a textual concordance to seven other early-modern editions of this translation, in La 'materia médica' de Dioscorides: transmision medieval y renacentista, ed. C. Dubler, III (Barcelona: Tip. emporium, 1955) (UT); and the English translation of John Goodyer which was made in 1655 but remained unpublished until the edition of John Gunther, The Greek Herbal of Dioscorides (New York: Hafner, 1933). There is also the revised and annotated edition of Dioscorides made by Pietro Andrea Mattioli (1501-77), who was botanist to the Emperor Maximilian II and responsible for a great revival of interest in the ancient author. The Latin editions of this work include Commentarii secundo aucti in libros sex Pedacii Dioscoridis, ... (Venice: Ex officina Erasmiana, 1558) (UTRB); another from Lyons of 1562 (UTRB); and an

Langòas.

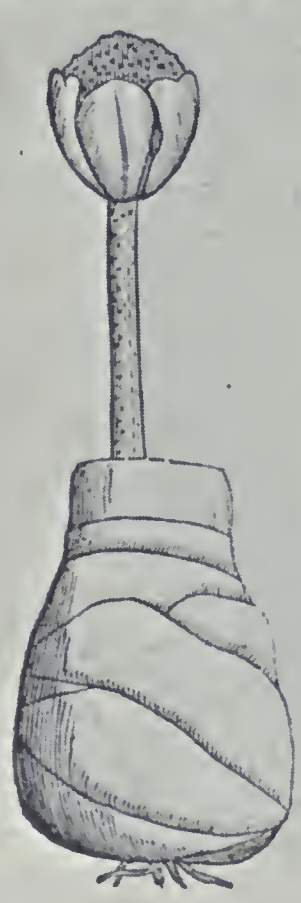
mum lata habet, nervis evidentibus notata, marginibus æqualia; costa horum media crassa & succulenta est. Succus cum aceto potus potenter abortum movet, & menses ciet.

Folia Tulipæ promontorii bonæ spei.



Tulipa Capensis, sive *promontorii bonæ spei*, bulbum pugno majorem habet, ex squamis crassis constantem, qui nauseabundum odorem emittit. Ante folia flos bulbo Aprilimense erumpit, qui purpureo colore valde gratus est; ferè quinis constans foliis oblongis, lævibus, crassis, & in summo orbiculatis. Flore cavitas staminibus ex rubro albicantibus repletur; quibus insidet appendicula crocea: flos cauli spithamum longo, rotundo insistit, qui fundi albi maculis guttisque purpureis variegatus est. Nascitur locis montanis. Folia lata crassa, habet. Flore defluente, semina umbella habet, multis actnis purpureis, quæ grana duo vel tria singula continent, ex staminibus eminentibus.

Tulip promaontorii bonæ spei.



Verbena Indica lanuginosa.

Theophrastus, De historia plantarum, Amsterdam, 1644.

edition from Venice of 1565 (UTRB). There is also an Italian translation of this work published in 1557 (UTRB).

There are also a number of early-modern editions of other classical writers on medical botany: an edition lacking the title page but probably published in 1493 of Celsus's De medicina libri VIII (AM), the text of which was lost during the Middle Ages and discovered only in the fifteenth century; other editions of the same work of 1551, 1657, 1665, and 1750 (AM); Galen's De simplicium medicamentorium facultatibus libri undecim, Theodrico Gerardo Gaudano interprete (Paris: S. Colin, 1530) (AM); Galen's Opera Omnia (Venice: Iuntae, 1556-77), 9 vols. (AM); Galen's Opera ex sexta juntarum editione, 5 vols. (Venice: Iuntae, 1586) (UTRB); Historia naturale di C. P. [Caio Plinio] Secondo (Venice: Vercelli, 1501) (AM); Pliny's Historia mundi libri XXXVII, ... (Lyons: B. Honoré, 1587) (UTRB); Pliny's Historia naturale, tr. Geronimo de Huerta (Madrid: L. Sanchez, 1624-9) (UTRB); The Historie of the World, Commonly Called the Natural Historie of C. Plinius Secundus (London: A. Islip, 1635) (AM), as well as many other early-modern editions of Pliny (UTRB); and a number of editions of the works of Paulus Aegineta (fl. c. 640), the last of the Greek writers on medicine (who remained in Alexandria after the Arab conquest and had a great influence on Arab medicine), including Pauli Aeginetae medici insignis opus divinum (Basel, 1532) (AM) and Pauli Aeginetae medici praestantissimi de medica materia libri septe (Venice, 1532) (AM).

B. Renaissance Editions of Arabic Works in Translation

The medical achievements of the Arabs were still sufficiently respected in the sixteenth and seventeenth centuries for a great many Arabic works to be published in European translations. Many of these had been made during the great period of translation of the twelfth century, while some — but by no means all which make the claim — were translated by scholars of the Renaissance. The medical writings of Avicenna, for instance, were published in many editions: Liber canonis (Venice, 1507) (UT, PIMS reprint); Avicene perhypatetici philosophi ac medicorum facile primi, opera, ... (Venice, 1508) (UT reprint); Joannis Hercolani expositio in primam seu quarti Canonis Avicenne (Venice: P. Pincia, 1512) (AM); Avicennae medicorum arabum principis Liber Canonis de medicinis cordialibus et cantica (Basel: J. Hervagius, 1556) (AM); and Avicennae arabum medicorum principis, Canon Medicinae (Venice: Iuntae, 1608) (AM). The work of Ibn Zuhr or Avenzoar (d. 1162) was published as Abhomeron Abynzobar: collegit Averroys (Venice: Barbadico, 1496) (AM), which apparently contains the Taiṣir and Antidotarium of Ibn Zuhr followed by the Collegit of Ibn Rushd or Averroes; a later edition of this work, published in 1514, is also available (AM). Another early publication of an Arabic work in translation was Haly filius Abbas ('Ali ibn 'Abbās al-Majūsī), Liber totius medicinae necessariae ... (Lyons, 1523) (AM), which is the encyclopedia of this great physician of the Eastern Caliphate. The works of Al-Rāzi or Rhazes appeared as Almansoris liber nonus cum expositione Sillani (Venice: O. Scotus, 1490) (AM); Praxis in nonum Almansoris (Leyden: J. Moylin, 1527) (AM); and Continens Rasis ... (Venice, 1529) (AM). Finally, there were various early-modern editions of the mysterious Johannes Mesue, who was probably Māsawaih al-Mārdīnī (d. 1015): De re medica, libri tres (Paris: C. Wechelus, 1542) (AM); Mesuae medici clarissimi opera ... (Venice: Iuntae, 1570) (AM); and I libri Digio. [di Giovanni] Mesue dei semplici purgativi e delle medicine composte (Venice: Alessandro de' Vecchi, 1621) (AM).

Herbarius latinus, Louvain (?), 1484-85 (?)

C. Editions of Mediaeval Works

Probably the first printed work to contain a section devoted exclusively to medical botany was the encyclopedia of Bartholomaeus Anglicus, an English Franciscan who flourished towards the middle of the thirteenth century. Although much of this work presents scientific views which had already been superseded at the time of writing, the section on trees and herbs is more advanced and suggests that the author based this part of his book on personal observation. First published in 1470, this work is available in three editions: Liber de proprietatibus rerum (Strasbourg, 1505) (PIMS); Opus de proprietatibus rerum (Nürnberg: F. Pepsus, 1519) (PIMS); and De proprietatibus rerum (London: T. Bertheletus, 1535) (UTRB), which is an English translation.

One of the earliest printed herbals was the Herbarius latinus, first published in Mainz in 1484. An anonymous work, the Herbarius is based on a wide variety of ancient and mediaeval sources (though, curiously, Apuleius is not mentioned) and was probably compiled towards the middle of the fourteenth century. As it lists only plants which were common in Germany, it seems to have been intended to give German people cheap and accessible remedies. Our edition of the Herbarius latinus (Louvain?: Jan Veldener?, 1484-5?) (UTRB) gives the names of plants in Dutch as well as Latin.

One other mediaeval book of remedies and rules of health was also published frequently during the Renaissance: the Regimen sanitas of the ancient School of Medicine in Salerno. This book, given to patients who came from all over the world, was immensely popular for centuries and parts of it still live today in the proverbs of many European languages. It is available in various editions, including Regimen sanitatis salernita, ... (Frankfurt: Haered. Chr. Egenolphus, 1557) (AM); ibid. (Venice: J. M. Lenus, 1573) (AM) and other editions of 1612? and 1711 (AM); and in an English translation made by Sir John Harrington in 1607, The School of Salernum. Regimen sanitas Salerni (Salerno: Ente Prov., 1966) (AM).

D. Early-Modern Works in a Traditional Vein

Of the new books of remedies written after the invention of printing, many are available in Toronto: a facsimile of the 1515 edition of Quiricus de Augustis, Dlicht d'apotekers (Nieuwkoop: de Graaf, 1967) (UT), which is a translation into Dutch of the Lumen Apothecarium of 1492, written by a doctor of Tortona who was personal physician to the daughter of Charles of Bourbon; a facsimile of the 1561 edition of Hieronymus von Braunschweig, A Most Excellent Homish Apothecarye (Amsterdam, New York: De Capo, 1968) (UT), which is a translation into English of the Liber de arte distilleni de simplicibus of 1500; a facsimile of the 1525 edition and version in modern English of Richard Banckes's An Herbal (1525), ed. S. Larkey & T. Pyles (New York: Scholars' Facsimiles and Reprints, 1941) (UT, UTPh), the first book exclusively on herbs to be printed in the English language; Charles Estienne, De re hortensi libellus, vulgaria herbarium, florum, ac fruticum (Lyons: S. Gryphius, 1539) (UTRB); and J. Sylvius, De medicamentorum simplicium (Venice: Erasmiana, 1543) (AM).

One of the most impressive and scholarly of early modern works was the Latin herbal of Leonhard Fuchs, Professor of Medicine at the Universities of Ingolstadt and Tübingen, whose masterpiece was first published in 1542. The book deals with some 400 plants native to Germany and about 100 foreign plants,

many of which are illustrated with very beautiful woodcuts. This work is available as Primi de stirpium historia commentariorum, ... (Basle, 1549) (AM); De historia stirpium commentarii insignes, ... (Lyons: B. Arnollet, 1549) (AM); and a facsimile of New Kreüterbuch (Basle: M. Isingrin, 1543) (UT), which was a German translation made from the first Latin edition and includes all the original illustrations. This great work gave rise to much imitation, piracy and plagiarism. A Lowland botanist, Robert Dodoens, Professor of Medicine at the University of Leyden, and physician to the Emperors Maximilian II and Rudolph II, took Fuchs as his model and used many of his illustrations in his herbal first published in 1552. This is available in an English translation, A new herball or historie of plants, ... (London: E. Bollifant, 1595) (UTRB). At the same time, another translation was made into English by a certain Dr. Priest, whose efforts were pirated by John Gerard and published in 1597 as an original work. There were many later editions, including The Herball; or General Historie of Plants, ... (London: A. Islip et al., 1633) (TPL; UTRB) and ibid., (London: A. Islip et al., 1636) (AM). Indeed, in spite of its inglorious ancestry and the many errors it contained, this work was to become perhaps the most popular of all English herbals.

Of the books of materia medica published in the second half of the sixteenth century and after, a good selection is available in Toronto, including Antonius Musa, De medicamentibus tam simplicibus quam compositis (Zurich: Gessner, 1555) (AM); a facsimile of the London edition of 1559 of the work of a great Swiss botanist, Conrad Gessner, Treasure of Evonymus (Amsterdam, New York: da Capo, 1969) (UT); a work of the justly famous, if argumentative, Venetian, Petro Andrea Mattioli, De plantis epitome utilissima (Frankfurt am Main, 1586) (UTRB); Antonio Mizauld, Historia hortensium quator opusculis methodicis contexta, ... (Cologne: J. Gymnicus, 1577) (UTRB); Giovanni Battista della Porta, Phytognomonica, ... (Rouen: I. Berthelin, 1650) (TPL), a book first published in 1588 in Naples, in which the author develops the theory of signatures of Paracelsus, according to which the medical properties of plants can be detected from the external characteristics, e.g. a plant which lives a long time will be conducive to longevity, and so forth; Charles de l'Ecluse (Carolus Clusius), Rariorum plantarum historia (Antwerp: J. Moret, 1601) (AM), which is a first edition of this work of the famous Professor at Leyden, in which he presented his findings from expeditions to Spain, Austria and Hungary, adding approximately 600 plants to those already known; by the same author, Exoticorum libri decem, quibus animalium, plantarum, aromatum ... describuntur (Antwerp: Raphelengius, 1605) (AM); Simon Paulli, Quadripartitum botanicum de simplicium medicamentorum (Strasbourg: by the author, 1667) (UTRB); John Parkinson, Theatrum botanicum... or, an Universall and Compleat Herball (London: T. Cotes, 1640) (ROM); Robert Lovell, Enchiridion botanicum or Compleat Herball (Oxford: W. H. for R. Davis, 1665) (UTRB); St. Hilaire, Les remèdes des maladies du corps humain (Paris: J. Couterot & L. Guérin, 1685) (AM); J. B. van Helmont, Ortus medicinae (Leyden: Deunet, 1655) (AM); and Freywillig ausgesprungener Granat-Apfel des Christlichen Samariters. Oder: aus Christlicher Liebe des Nächsten, ... (Nürnberg: Trautner & Schmidt, 1731) (UTRB), a work which, appearances to the contrary, is mainly on the preparation of medicines from plants.

E. Works on Exotic Drugs

Another small group of early-modern works shows the expanding geographical horizons of European man, who, on new continents, found new drugs and new uses for drugs, some of which were to have a lasting influence

on medical practice. One of these was composed in 1552 by an Aztec physician, Martín de la Cruz, and translated into Latin by another Indian, Juan Badianus. The best edition, The Badianus Manuscript (Codex Barberini, Latin 241) Vatican Library, ed. E. Emmart (Baltimore: Johns Hopkins, 1940) (UT), gives a colour facsimile of the manuscript, the Latin text and an English translation.[1] There is also available the Latin text and a Spanish translation in Martín de la Cruz, Libellus de medicinalibus Indorum herbis (Mexico D. F.: Vargas Rea y el Diario Español, 1952) (UTPh) and the Spanish translation in ibid. (Mexico D.F.: Inst. Mex. de Seguro Social, 1964) (TPL). At the same time, Europeans' knowledge of Eastern plants was growing through the travel of European botanists, such as Prosper Alpino (1553-1617), Professor of Medicine at the University of Padua and director of the city's botanical garden, who spent three years botanizing in Greece and Egypt and wrote Historiae Aegypti naturalis pars prima [et secunda] (Leyden: G. Polvliet, 1731) (UT; AM has two copies of the 1640 edition of Vol. 2, which describes Egyptian plants). Indian materia medica was described for Europeans by the Spanish naturalist and doctor, Garcia de Orta, who settled in Goa in 1534 and published there in 1563 his Coloquios dos simples e drogas da India (Lisbon: Imprensa Nacional, 1891-5) 2 vols. (UT). This work is also available in an Italian translation (Venice: Herede di Girolano Scot, 1605) (UTRB); a French translation (Lyons: J. Pillehotte, 1619) (UTRB); and a Latin translation (made by Clusius) reproduced in a facsimile of the 1567 edition (Nieuwkoop: B. de Graaf, 1963) (UT). Another work informing Europeans about Indian drugs was N. Monardis, De simplicibus medicamentis ex occidentali India delatis (Antwerp: C. Plantin, 1574) (AM).

5. Pharmaceutical Literature in a New Vein

The profusion of books of remedies that appeared in early-modern times soon gave rise to a concern on the part of authorities to protect the public from the wilder excesses of the authors of these books. Accordingly, a new type of literature began to appear which ultimately nearly — but not completely — displaced the older type. The new works were of two kinds. The first were "official" formularies, usually in Latin, compiled by mandate from civic or state authorities or from colleges of physicians. The second were pharmaceutical collections in the vernacular, often sponsored by kings and princes or universities, and usually embodying the results of recent research as well as age-old remedies.

A. Official Pharmacopoeias

The first pharmaceutical formulary with any possible claim to being official is the Nuovo receptario published in Florence in 1499 (NAT), a work that was strongly influenced by Arabic ideas on therapy. It was followed half a century later by a second work which has perhaps a stronger claim, the Dispensatorium pharmacopolarum of Valerius Cordus, published in 1546 on mandate of the civil authorities of Nürnberg (NAT). This collection of recipes selected from works of respected ancient authors was legally binding on all practitioners in the Nürnberg area.

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[1] I am indebted to Mrs. John Langdon for drawing my attention to this work. — A.W.

Despite the considerable number of similar collections authorized by Italian city guilds from 1559 on (Mantua, followed by Bologna in 1574, Bergamo in 1580, Rome in 1583, Venice in 1618, et al.), and a flourishing pharmaceutical literature produced in France by physicians in the sixteenth century, and by pharmacists from the mid-seventeenth century onwards, it was left to Germany, where governmental control of the pharmaceutical profession had appeared at an early date (the Hohenstaufen Emperor Frederick II had issued regulations for the physicians and pharmacists in the Kingdom of the Two Sicilies before the middle of the thirteenth century), to take the lead in the production of "official" pharmacopoeias.[1] In 1564 the imperial city of Augsburg authorized the Pharmacopoeia Augustana, a more comprehensive work than that of Cordus, and one which was to serve as a standard for the next 150 years and on which many "national" pharmacopoeias were to be modelled. There were several subsequent editions, and in 1618 it was made the official standard for Vienna and the Austrian provinces. A facsimile is available of the first Pharmacopoeia Augustana (Madison: State Historical Society of Wisconsin, 1927) (UTPh). There are also available three later editions, all in Latin, edited by Johann Zwelfer, a German pharmacist-turned-physician: Pharmacopoeia Augustana reformata (Nürnberg: Endteros, 1657) (UTRB); ibid. (Gouda: W. Verhoeven, 1653) (UTRB); and ibid. (Rotterdam: A. Leers, 1653) (UTRB). These editions also contain Zwelfer's Pharmacopoeia regia, which is also available in separate editions: (Nürnberg: Endteros, 1668) (UTRB); (Nürnberg: Endteros, 1675) (UTRB); and Nürnberg: Endteros, 1693) (UTRB).

The first "national" pharmacopoeia was the Pharmacopoeia Londinensis of 1618, published by the Royal College of Physicians, intended to apply to the whole country; this is available in facsimile (Madison: State Historical Society of Wisconsin, 1944) (UTPh, AM). The history of the publication of this work is of considerable interest, for there were actually two "first editions" in 1618. As early as 1585 the College began to debate the usefulness and wisdom of producing a standard for the use of all apothecaries; by 1589 it was decided to proceed, and a committee of physicians was named to supervise the work. No apothecaries were included in the committee, nor was their advice sought on the preparations to be included — although it appears that some of the most experienced were consulted about methods of preparation and dosage. The work proceeded slowly, and in May of 1618 the Pharmacopoeia finally appeared, only to be replaced in December by a "corrected" and henceforth "official" edition. No reason for the change was given, except that the May version was "incomplete." A comparison of the two suggests that the "modern" viewpoint had gone too far in the earlier edition in eliminating many of the centuries-old nostrums, both "simples" and "compounds": the May edition had 680 simples and 712 compounds, while the December edition had 1190 simples and 963 compounds (many of the latter including 10-30 ingredients, several more than 50, and one antidote against the plague more than 130!). Another indication of a new approach was the inclusion in both versions of many of the newer "chemical" preparations, perhaps owing to the influence of Sir Theodore Mayerne, a medical graduate of Montpellier, one-time royal physician in Paris, since 1611 physician to James I and his Queen, and Fellow of the College of Physicians.

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[1] The term "pharmacopoeia" was first used by the French physician, Jacques de Bois (Sylvius), in the title of a private work, Pharmocopoeiae libri tres (Paris, 1548) (NAT). Several of his other works are available: Methodus medicamenta componendi (Paris: C. Wechelus, 1541) (AM); and De medicamentorum simplicum delectu, praeparationibus, mistionis modo, libri tres (Paris: J. Grasellus, 1542) (AM); and ibid. (Venice: V. Vaugris, 1543) (AM).

Subsequent editions of the Pharmacopoeia Londinensis appeared at intervals of about thirty years. The second edition, of 1650, added salts of mercury to the chemicals; the third, published in 1677 and dedicated to Charles II, was given a new title, Pharmacopoeia Collegii Regalis Londini. A later printing of this is available (London: Basset et al., 1682) (UTRB). In the fourth edition, of 1721, more chemicals were included and the botanical descriptions were improved, probably through the influence of Dr. Hans Sloane. The fifth edition, that of 1746, incorporated many innovations as the result of the influence of another English scientist, Dr. Henry Gresham, Professor of Physics and an outstanding chemist. This is available in two later printings: Pharmacopoeia Collegii Regalis Medicorum Londinensis (London: T. Longman et al., 1747) (UTRB) and ibid. (London: J. Nourse, et al., 1771) (UTRB). The two texts seem identical, although the printing of 1771 has been reset. By the sixth edition, (London: J. Johnson, 1788) (UTPh, UTRB), the "grand compositions" of yore were well on their way to disappearing, and many more chemical preparations and new drugs were included. In the seventh edition (London: G. Woodfall, 1809) (UTRB) a number of preparations from the Edinburgh and Dublin pharmacopoeias are incorporated; this edition is the first to employ the chemical nomenclature of Lavoisier. This pharmacopoeia was also published in several French editions: Pharmacopée du Collège Royal des Médecins de Londres (Paris: Didot, 1771) (UTRB), which is a French translation of the second English edition; and ibid. (Paris: Ballière, 1837) (UTRB), which has parallel Latin and French texts.

Only in 1699 did the Royal College of Physicians in Edinburgh publish its first Pharmacopoeia Edinburgensis, of which subsequent editions appeared every ten to twelve years. An English translation of the third edition is available (London: W. Innys, 1740) (AM), as well as four Latin editions: the sixth edition (Edinburgh: W. Sands et al., 1744) (UTRB), which eliminated much that was outdated; a revision (Edinburgh: Hamilton et al., 1756) (UTRB), which is bound with the third edition of the Pharmacopoeia pauperum, the first edition of which had appeared in 1746, five years after the establishment of the Edinburgh Royal Infirmary for the treatment of the poor; a Dutch edition (Rotterdam: H. Beman et al., 1775) (UTRB), which was a sign of the popularity of this work on the continent; and another continental edition, Pharmocopoeia Edinburgensis ... additamentis aucta ... (Bremen: Görster, 1776) (UTRB).

France received its first national pharmacopoeia only in 1818, when the rules of the first edition of the Codex medicamentarius seu pharmacopoeia Gallica (NAT) became obligatory for the whole of the country. From the early 17th century, regulation of the pharmacists was in local hands, and there was a series of civic formularies, beginning with that of Lyons in 1628. Although we have not been able to verify the title, it is possible that the Oeuvres pharmaceutiques of François Rauchin, "conseiller, médecin et professeur du Roy, Chancelier de l'Université de Médecine à Montpellier," (Lyons: P. Ravard, 1628) (UTRB) is that formulary. The third of the local collections to appear was the Codex medicamentarius seu pharmacopoeia Parisiensis, available in a later edition (Paris: P. Cavelier, 1758) (UTRB).

While the 17th century in Germany saw civic sponsorship, the 18th century brought official support from the states, beginning in 1698 with the Dispensatorium Brandenburgicum (NAT), the forerunner of a long line of state pharmacopoeias, of which a few are available in Toronto. In 1741 appeared the Pharmacopoeia Wirtembergica, highly esteemed and widely used even beyond Germany, one of the most comprehensive collections to date. Two editions are available, both revised and amended: the third edition (Stuttgart: J. Erhard,

1754) (UTRB); and a later edition (Lausanne: J. Pott, 1785) (UTRB). There is also a Pharmacopoeia Austriaco-provincialis emendata, (Vienna: Wappler, 1794) (UTRB), which is the last Latin edition of this work first published in 1774, (its name signifying that Austria was but one of the many provinces of the Empire). We have two editions of the Pharmacopoeia Borussica, first published in 1799, which was one of the first official pharmaceutical formularies to be based on the new chemical theories and the first such compilation in Germany to be prepared primarily by pharmacists and not by physicians; these are the fifth edition (Berlin: C. Plahn, 1829) (UTRB) and the sixth edition (Berlin: R. Decker, 1846) (UTRB).

From other parts of Europe, there are available the following official pharmacopoeias: Pharmacopoeia Batava (Amsterdam: J. Allart, 1805) (UTRB) and its Dutch translation, Bataafsche Apotheek (Amsterdam: J. Allart, 1807) (UTRB); Pharmacopoeia Belgica (The Hague: Typographia Regia, 1823) (UTRB) and its translation into Dutch, Nederlansche Apotheek ('s Gravenhage: Algemeene Landsdrukkerij, 1826) (UTRB); Pharmacopoeia Slesvico-Holsatica (Kiel: Libraria Universitatis, 1831) (UTRB); Pharmacopoeia Norvegica .. (Oslo: Brögger et al., 1854) (UTRB); and Pharmacopoeia Hispana (Madrid: M. Repulles, 1817) (UTRB).

The preference for Latin as the official language of the pharmacists followed the profession to the New World, where, however, after many vicissitudes, the Pharmacopoeia of the United States of America (Boston: Wells & Lilly, 1820) (UTRB) finally appeared with both Latin and English texts.

B. Sponsored Works in the Vernacular

As books in Latin were becoming increasingly inaccessible to the public, and sometimes even to pharmacists, there soon appeared formularies in the vernacular; these were often sponsored by royalty or by universities and sometimes had a quasi-official status. The earliest of these works is Oswald Gabelhouer's The Boocke of Physicke (Dordrecht: I. Caen, 1599) (UTRB), which, as the title page explains, was written "through the commaundement of the most Illustrious, & renouned Duke & Lorde, Lorde of Lodewijcke, Duke of Wirtenberghe, & of Teck, Earle of Mompelgart, etc....faithfully translated out of High-duche by the right Worshipful Mr. Doctour Charls Battus...now nuelye translated out of Low-duche into Englishe by A. M." This English edition is dedicated by the publisher to Queen Elizabeth, and contains a representative collection of late 16th century remedies for all manner of ills, including "an excellent foot-bath for the head-ache."

About sixty years later, Nicolas LeFevre, French chemist, apothecary and professor of botany and chemistry at the Jardin du Roi, published his Traité de chymie théorique et pratique, which was to go to several editions. In 1660, at the request of Charles II, he came to England, to become "Royal Professor in Chymistry to his Majestry of England, & Apothecary in Ordinary to His Honorable Household"; and four years later appeared an English version of his Traité entitled A Compleat Body of Chymistry, (London: T. Ratcliffe, 1664) (UTRB), dedicated to Charles II, for "the use of all Apothecaries etc." Despite LeFevre's undoubted contributions to chemistry, including the discovery of mercuric acetate and the introduction of the thermometer, he still conceived of his science as a collection of secrets and mysteries. Another indication of the influence of French pharmacist-chemists on English practice is the Pharmacopée royale, Galenique et chymique of Moyse Charas, "Dr. en

médecine, ci-devant démonstrateur de l'une et de l'autre pharmacie au Jardin Royal des Plantes.." First published in the 1670's it went through many editions, including (Paris: L'auteur, 1681) (AM) and (Lyons: Anisson et al., 1704) (UTPh).

Another French pharmacist whose works were widely translated was Nicholas Leméry, whose Cours de chymie (NAT), published in 1675, superseded that of LeFevre. He also wrote a Pharmacopée universelle, first printed in 1697, in which he attempted a synthesis of all existing manuals (with his own additions) but rejected conflicting and useless ingredients in many compounds. The second edition is available (Paris: d'Houry, 1716) (UTRB); this was revised, corrected and amended, published "avec approbations et privilège du Roy" and dedicated to M. Guy Crescent Fagon, "conseiller d'état ordinaire et Premier Médecin du Roy."

The Collectanea chymica Leydensia ... Maetsiana, Margraviana, Le Mortiana (Leyden: H. Drummond, 1684) (UTRB) has been attributed to Christopher Love Morley. This was apparently published from notes of de Maets, Margrav and Le Mort, three professors at Leyden, and was attacked in the same year by de Maets on the grounds that it was published without the consent and knowledge of either Morley or himself. It contains definitions, descriptions of equipment, methods, etc., and represents the trend away from fantastic preparations (some dating back to antiquity) and toward a careful evaluation of the worth of both the traditional remedies and the products of the New World. There is also available a later edition, (Antwerp, 1702) (UTRB), which contains additional experiments by Theodor Muykens, a disciple of de Maets.

Two works which are available by the English scientist, Robert Boyle, one of the founders of the Royal Society, have medical implications and should be mentioned here. The first of these is Of the Reconcileableness of Specifick Medicines to the Corpuscular Philosophy to which is annexed a discussion about the advantages of the use of simple medicines. (London: S. Smith, 1685) (UTRB). The second work is entitled Medicinal Experiments: or, a Collection of Choice and Safe Remedies (London: S. Smith et al., 1696) (UTRB).

6. Do-it-yourself Manuals

As the works considered above were written mainly for scientists, physicians or pharmacists, it was perhaps inevitable that another kind of literature would spring up intended for the common man who wished to minister to his own ailments and those of his family. The earliest of these works which is available is a later edition of a book that first appeared in 1555 or 1557: The Secrets of Alexis [Alessio of Piedmont] (London: W. Stausby, 1615) (UTRB). Whether the author was Alessio or Girolamo Rucelli of Viterbo cannot be determined. In any case it was popular indeed, going through 56 editions by 1600. Our copy was translated from a French edition and the Italian original, and describes the "maner to make distillations, parfumes, confitures, dyings, colours, fusions and meltings", including one "to cleare & make cleane the face from all manner of spots."

Next in time, and high in entertainment value, is the Pharmacopoeia Londinensis: or, the London Dispensatory of Nicholas Culpeper, "Gent. Student

in Physik and Astrology." First published in 1649, this unauthorized translation of the official pharmacopoeia of 1618 is available in the sixth edition (London: P. Cole, 1659) (AM). The work was "further adorned by the Studies and Collections of the Fellows, now living of the said Colledg." Culpeper provided in English accurate lists of effective simples, along with directions for their use — spiced with many a snide remark at the expense of the College, their pharmacopoeia, and their supposed learning. The following observation, concerning the value of Raparum folia, is typical: "If they do not mean Turnep-leaves, I know not what they mean, nor it may be themselves neither, the greatest part of them having as much knowledge in Simples, as a Horse hath in Hebrew."

Another popularizer of the Pharmacopoeia Londinensis was William Salmon, "Prof. of Physick" and one of the most outstanding "quacks" of the day. Salmon had no formal training in medicine or pharmacy, but by immersing himself in the literature of the time he became a widely read and progressive "practitioner" of medicine. In the late 1670's he published his first edition of the Pharmacopoeia Londoninensis or the New London Dispensatory, of which we have a copy of the third edition (London: T. Dawks et al., 1685) (UTRB). The work went through eight editions by 1716.

Salmon was also involved with another popular vernacular collection of remedies, that of George Bate, who had been physician-in-ordinary to Charles I and II, and to the Lord Protector Cromwell. Bate's formulae were so highly regarded that in 1688, nineteen years after his death, they were published in Latin by the London apothecary James Shipton. His work, known as the Pharmacopoeia Bateana: or Bate's Dispensatory, proved popular all over Europe. Salmon's English translation from the 2nd Latin ed., was dedicated in 1693 to William III and published in London in 1694. In it Salmon makes no bones about identifying his own contribution: that of Bate appears small in comparison! Two copies in English of this work are available: Pharmacopoeia Bateana (London: S. Smith et al., 1694) (UTRB) and another copy from which the title page is missing which appears to be an edition of 1699 (UTPh). There are also available two Latin editions from the same year, (London: G. & J. Innys, 1719) (UTRB) and (Amsterdam: Wetstenios, 1719) (UTRB), as well as a later edition from the Lowlands (Louvain: van Overbeke, 1752) (UTRB).

Thomas Fuller, one-time editor of the Pharmacopoeia Bateana, was the author of several books and pamphlets, of which his Pharmacopoeia extemporanea proved very popular and went through many editions. There are available two editions of 1714 (UTPh, UTRB), two editions of 1731 (UTRB), and editions of 1734, 1752, and 1785 (UTRB), four of which were published on the continent. Fuller is also represented by his Exanthematologia: or an attempt to give a rational account of eruptive fevers, especially of the measles & small pox, in two parts .. to which is added an Appendix concerning Inoculation (London: C. Rivington et al., 1730) (AM).

Another English physician who presented his favourite remedies to the public was John Radcliffe, author of Pharmacopoeia Radcliffeana (London: C. Rivington, 1716) (UTRB). Radcliffe's fees are said to have amounted to at least £4,000 per year. Still another English apothecary-turned-physician and author on medical and pharmaceutical subjects was John Quincy, whose Pharmacopoeia officinalis & extemporanea: or, A Complete English Dispensatory reached its sixth edition (London: J. Osborn et al., 1726) (AM), "much enlarged and corrected, to which is added an account of the common adulterations both of simples and compounds, with some mark to detect them by."

A copy entitled A Complete English Dispensatory, which is lacking the title page but was probably printed in London after 1732, is also available (UTRB).

An interesting treatise by William Withering, M.D., Physician to the General Hospital at Birmingham, made an important contribution to medicine. First published for Scottish medical friends in 1775, An Account of the Foxglove, & Some of its Medical Uses (Birmingham: M. Swinney, 1785) (AM), led to the re-admission of digitalis to the 1783 edition of the Pharmacopoeia Edinburgensis.

There are also available some vernacular formularies from the Continent, the earliest of which is the Recueil de receptes, choisies, experimentées & approuvées of Marie Fouquet, (Montaubin: Dubois, 1676) (UTRB). From Italy comes the Teatro farmacéutico dogmatico, e spagirico of Dr. Guiseppe Donzelli with additions by his son, Tomaso (Venice: Bertoli, 1704) (UTRB). In Spanish, several works are available. The earliest of these is Don Felix Palacio's Palestra pharmaceutica chymico-Galenica (Madrid: de Sierra, 1725) (UTRB), which includes four drawings of chemical equipment; this work was dedicated to Sr. Doctor Don Juan Higgins, among whose titles were President of the Royal Society of "Medico-Chymica" of Seville, and Chief Doctor to Philip V; there is also N. R. Cuelho and J. A. da Costa, Pharmacopea Tubalense, chimico-Galenica (Rome: Geredini, 1760) (UTRB), with text in Spanish, dedication in Portuguese, and an interesting assortment of necessary licenses from the Holy Office, the Pope, etc., dated 1533 and 1535. Finally, there is the Filosofía farmaceutica, o la farmacía reducida a sus verdaderos principios (Madrid: Imprenta Real, 1804) (UTRB) by Gregorio Bañares, "Boticario de Camera" of their Majesties.

Editor's note. See also "A Survey of Early Biological Books in Toronto, 1450-1700" by F. D. Hoeniger and Joel Kaplan, in R & R, III, No. 3 (March 1967), pp. 2-11.

Appendix: The Dispute Between Physicians and Apothecaries

Our last category of material is the product of sporadic scuffling between the Royal College of Physicians and the Apothecaries of London which, beginning in the 1630's, developed into a raging pamphlet war shortly after the Plague of 1665. From 1669-1671 the London presses poured out countless pages of vitriolic charge and counter-charge. The Physicians claimed that Apothecaries charged outrageous prices for their wares, that they were generally incompetent and guilty of frauds innumerable, and that they usurped the Physicians' right to "practise" medicine. The Apothecaries retorted that the Physicians' fees were exorbitant, that book-learning was not necessarily a mark of ability to practise, and that the Physicians had run away from the Plague and left the Apothecaries to do their best for the City. Two pamphlets from this round are available, both written by Christopher Merrett, "Doctor in Physik, Fellow of the Colledg of Physicians and of the Royal Society": A Short View of the Frauds and Abuses Committed by the Apothecaries (London: J. Allestry, 1660) (UTRB); and A Short Reply to the Postscript etc. of H. S. Showing his many Falsities in Matters of Fact, ... (London: T. R., 1670) (UTRB). The furor died down in 1671, perhaps because the pamphleteers had become repetitive and needed more material before another all-out battle could ensue.

In 1695 the College resurrected a proposal to set up a dispensary to provide free medical advice for the poor, an idea first suggested in 1675 but scarcely greeted with enthusiasm by the Apothecaries. Various attempts to achieve co-operation failed, although not all the Apothecaries were opposed (nor all the Physicians in favour). In the end, the dispensary was opened by the College. Once again the London presses poured out invective, and the public treated to another round of charge and counter-charge: A Pill to Purge the Dispensary Doctors (London: The Author, 1702) (UTRB); The Necessity and Usefulness of the Dispensaries Lately Set Up (London, 1702) (UTRB); R. Pitt, The Craft and Fraud of Physic Expos'd (London: T. Childe, 1703) (AM), which is the third edition "with a new Preface explaining to the meanest Capacities, the Controversy between the Physicians of the Dispensary, and the Quacks supported by their Physicians, and Others who serve under them." Meanwhile, the whole affair had been immortalized by Doctor (later Sir) Samuel Garth, who in 1696 had written The Dispensary, a six-canto poem in mock heroics in which the antagonists, individually and collectively, were effectively caricatured, and the issues subjected to the acid of his wit. Three impressions of the poem were published within a few months, testifying to its popularity. The poem is available in The Poetical Works of Sir Samuel Garth (Edinburgh: Apollo, 1779) (UTRB).

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Marshall McLuhan

In his *European Literature and the Latin Middle Ages* (New York: Pantheon Books for Bollingen Foundation Inc., 1953), Ernst Robert Curtius points out that 'in ancient Greece there is hardly any idea of the sacredness of the book' (p. 304). Homer and Hesiod are pre-literates and 'Pindar and the tragedians are the first to conceive of memory as a written record' (p. 304). Curtius further explains why the idea of the '"erudite poet" (*doctus poeta* among the Romans)' (p. 305) only entered Greek culture in the Hellenistic period. It was during the Augustan period that book culture became the basis of the new kind of encyclopedism such as Cicero propagated which was represented by Virgil and the other Roman poets. St. Augustine, a teacher of grammar and rhetoric himself, took it for granted that the Christian student of Scripture would avail himself of the new encyclopaedic learning made available by the new Augustan libraries and schools. The *translatio studii* or transmission of traditional pagan learning was mainly accomplished by the uniting of the ideals of *doctus poeta* and *doctus orator* to the functions of scriptural exegesis and preaching.

Robert Hollander in *Allegory in Dante's Commedia* (Princeton: Princeton University Press, 1969), using the work of Henri de Lubac (*Exégèse Médiévale: Les Quatre Sens De L'Ecriture,* 4 vols., Paris: Editions Montaigne, 1959-1964), shows how Dante became heir to this entire tradition of multi-level exegesis. He does not concern himself with the role of the poet as *doctus orator,* but this major current is carried abundantly in the manuals of instruction for a Christian prince, which were exceedingly popular and influential.

It is worth mentioning another work which is of great relevance to the student of Dante as well as to the history of eloquence. I refer to Rosalie L. Colie's *Paradoxia Epidemica: The Renaissance Tradition of Paradox* (Princeton: Princeton University Press, 1966). The tradition of paradox from ancient through mediaeval and renaissance times called for the utmost erudition and virtuosity from the *doctus orator.* Dante's *Divina Commedia* is the central Christian paradox of the happy fall on which Dante lavishes the same scope of learning and exegesis as the Fathers had done. The great paradoxes in this tradition are, of course, familiar in Erasmus' *The Praise of Folly,* and Rabelais' *Gargantua,* to both of which and to many others, she devotes attention. John Donne's *Biathanatos* as a defence of suicide for Christians is only one of his paradoxes defended with great learning.

Since Homer was not a *doctus poeta* but a pre-literate bard, he could not, if only for this reason, have occupied the place of Virgil in the *Divina Commedia.* The student will be grateful to Eric Havelock for his definitive study of pre-literate encyclopaedism of the Homeric Age (*Preface to Plato,* Cambridge: Harvard University Press, 1963.) It was a training designed to encode the wisdom and experience of the entire community but it was directed toward a training of practical perceptions in affairs of daily life and had no relevance to literary or scriptural problems, so the eminence of Homer for Dante is only equalled by his irrelevance. There are, of course, other reasons why Dante chose Virgil to be his guide.

Perhaps the most expeditious way of illustrating the powerful continuity of the Ciceronian concept of eloquent wisdom is simply to point to the long tradition of statesmen's manuals. Many of these are cited by L. K. Born in his useful introduction to his translation of Erasmus'

Education of a Christian Prince: 'That there is a continuous line of succession at least from the time of Isocrates with his *Ad Nicoclem* to the twentieth century is beyond question.'[1] Unfortunately, Born has not seen that the Ciceronian-Augustine concept of the *doctus orator* is what really gives consistency to the tradition. Thus Plato and Aristotle, on whom he fruitlessly dwells, have really no place in the central discussion, while Machiavelli is consciously antipodal to the tradition. No better evidence both of Machiavelli's full knowledge of the Ciceronian tradition and his deliberate flouting of it could be found than in the *Contre-Machiavel* of Gentillet (trans. by Simon Patericke, London, 1577), who sets forth the traditional princely ideal of education based on morality and eloquent wisdom.[2] The Machiavellians despised civic or public eloquence and favored the cryptic or curt style which M. W. Croll has studied for us. Thus, the stylistic disputes of Ramus and Nashe are based on the most radical opposition of views.[3]

The treatises which Woodward published under the title *Vittorino da Feltre and other Humanist Educators* (Cambridge, 1921) all contribute to the picture of the Ciceronian ideal of eloquence. Vittorino and the other successors of Petrarch are patristic to a man. The Fathers certify their Ciceronianism and usually modify it considerably: 'The purely imitative treatment of Cicero was not the aim of Barzizza and of the scholars whom he typifies, such as Zabarella, Vergerio, and Vittorino. In the widest sense, these men set before themselves the reconciliation of the ancient learning with the Christian life, thought and polity of their own day; they had no dream of a dead reproduction of the past.'[4] Nothing is more indicative of the patristic sympathies of Vittorino than his aversion to dialectics except as an incidental preparation for rhetoric (p. 60). Likewise Aeneas Sylvius warns us to 'beware of logicians who waste time and ingenuity in verbal subtleties, in whose hands Logic is a thing not of living use but of intellectual death. You will remember that Cicero reproached Sextus Pompey for too great devotion to Geometry, and affirmed that far too much time was spent in his day upon Civil Law and Dialectic ... which withdraws our energies from fruitful activity, is unworthy of the true Citizen.' (*Ibid.*, p. 153)

This concept of the completely rounded citizen, the versatile and encyclopaedic individual, which all historians have agreed is the Renaissance ideal, is nothing if not Cicero's ideal orator: 'To sum up what I have endeavoured to set forth. That high standard of education to which I referred at the outset is only to be reached by one who has seen many things and read much. Poet, Orator, Historian, and the rest, all must be studied, each must contribute a share. Our learning thus becomes full, ready, varied and elegant, available for action or for discourse in all subjects. But to enable us to make effectual use of what we know we must add to our knowledge the power of expression.' (d'Arezzo, *ibid.*, p. 132) Like Roger Bacon, Aeneas Sylvius puts moral philosophy over mathematics and the physical sciences in the formation of the ideal prince: 'There is a danger lest in our interest in natural, or external, objects we find but a lower place for those weightier things which concern character and action.' (*Ibid.*, p. 156)

Approaching the question of how rhetoric could have become such a dominant interest of the sixteenth century, it is necessary to consider the fact that the Ciceronian ideal necessarily gave first place in education to the means of achieving eloquence. For eloquence was indispensable to the administrator and the prince. We have seen that this concept of learning was cherished throughout the Middle Ages because it had been baptized by St. Augustine and grafted into the main stem of patristic culture. Thus the sixteenth century was far from hav-

ing rediscovered the Ciceronian concept, although the new commercial developments greatly enlarged the scope of its application.[5] L. K. Born's statement concerning the concept of the perfect prince in the thirteenth and fourteenth centuries is really applicable to the entire Middle Ages and to the Renaissance, as well: 'In the political thought of the thirteenth and fourteenth centuries, the central figure about which the whole revolves is the prince. This emphasises the personal view toward rulership, which is characteristic of the period. Furthermore, in accordance with the mediaeval attitude, the writers of these centuries considered the real in terms of the ideal, and were interested in nothing less than in the pattern of the perfect prince.'[6]

Machiavelli and Castiglione are at the end of a long line of writers. However, Machiavelli still awaits the historical scholarship which is necessary to put him in his true perspective. Most writers have recognized that his Satanocratism or his violent fission of nature and grace, in which he is at one with Luther and Calvin, is thoroughly Christian. That is, Machiavelli, like Hobbes, Swift, or Mandeville, cannot be explained except in terms of Christian culture. There is nothing pagan about his scepticism concerning human nature.[7] He rather looked on nature as shut off from grace and as shut in upon itself, and abandoned to the interplay of its own distorted forces. Within this dying order, however, Machiavelli envisaged the ideal prince as a man devoted to political action, impressing his character upon the flux of events, and living solely for the commonwealth which alone is the expression of the integral laws of our now fallen nature.[8] There is much of the Old Testament attitude in Machiavelli – the attitude of trust in the prince as one who cooperates with God to bring good out of evil, having regard to the passionate and blind violence of men. Whether Machiavelli finally confounded political action with mere political technique and made of the latter an end in itself is not a question which can be easily determined. It is only necessary to insist that Machiavelli is anti-Ciceronian, and consciously so. He has no place for eloquence in his education since he has no trust in men's capacity to be persuaded to follow right reason, or any reason. The state must compel man to espouse a useful life free from the anarchy of the passions, and for this purpose eloquence is useless.

It is certainly not on these lines that the characters of Prince Hal and Hamlet were developed. Castiglione, however, cannot be regarded as the 'source' of Hamlet's character, since the concepts of Castiglione were universally current in his century. One might as justly say that Castiglione was the source of Sir Philip Sidney.[9] On the other hand, Castiglione would certainly not have had the enormous vogue he did in the sixteenth century had he not been the spokesman for a large party. Hoby compares Cicero and Castiglione at some length, saying, among other things: 'Cicero an excellent Oratour, in three bookes of an Oratour unto his brother, fashioneth such a one as never was, nor yet is like to be: Castilio an excellent Courtier, in three bookes of a Courtier unto his deare friend, fashioneth such a one as is hard to find ...' (p. 3). Castiglione himself says: 'I am content, to err with Plato, Xenophon, and M. Tullius ... in imagination of a perfect commune weale, and of a perfect king, and of a perfect Oratour ...'[10]

It is perfectly natural, therefore, that Elyot should have devoted two thirds of his *Governour* to discussing the virtues that became a gentleman who had authority in the commonwealth. It is equally natural that an educational system which arose in the sixteenth century to provide members for a governing class should be primarily concerned with 'character' or the achievement of the social and political virtues. It is pointless to rehearse Elyot's familiar

insistence on the need for eloquence and his encyclopaedic program for the attaining of this traditional ideal. It is perhaps less commonly recognized how thoroughly Elyot envisaged that ideal in the light of the patristic tradition, as seen, for example, in his enthusiasm for *The Institution of a Christian Prince* of Erasmus (Everyman, p. 48). Finally, in Elyot's wake, the long series of manuals for intending statesmen, mostly written by schoolmasters, the professional rhetoricians of the day, need only be referred to in order to focus the great influence of the rhetorical tradition.[11]

The first of 2 articles from a chapter in *From Cicero to Joyce*, soon to be published by McGraw-Hill.

Notes

1 New York: Columbia University Press, 1936, p. 99.

2 See Patericke's translation, ed. 1608, pp. 1; 12-13; 34; 189-190; 240-242; 309; 366.

3 L. K. Born (*op. cit.*) offers no insights into these matters, and does not consider Rabelais' *Gargantua*, both a blow at the dialecticians and a defense of the Ciceronian concept of princely education. More's *Utopia* really belongs in the same tradition quite as much as Elyot's *Governour*, Castiglione's *Courtier*, Ascham's *Scholemaster*, or Spenser's *Faerie Queene*. In this connection, almost the whole of Ruth Kelso's *Doctrine of the English Gentleman in the Sixteenth Century* (Urbana: University of Illinois Press, 1929, reprinted Gloucester, Mass.: Peter Smith, 1964) is relevant to a perspective of the Ciceronian tradition.

Born, however, in tracing the history of the princely manuals, unconsciously attests to the integrity of the encyclopaedic tradition. Isidore of Seville and Alcuin contributed to this literature (pp. 102-104). Peter Damian and John of Salisbury were notable representatives (pp. 109-114). And the *De Eruditione Filiorum Nobilium* of Vincent of Beauvais is a classic instance (ed. by A. Steiner, Cambridge, Mass., 1938).

4 W. H. Woodward, *Vittorino da Feltre*, Cambridge, 1921, p. 10. See also pp. 21; 27; 67; 185 for the fact that Vittorino's position was patristic. Woodward's failure to see the patristic tradition at work in these humanists is easily excusable when it is considered that, forty years later, many specialists in the field are still oblivious of it. Leonardo d'Arezzo, defining true learning and eloquence strikes at the dialecticians: 'True learning, I say: not a mere acquaintance with that vulgar, threadbare jargon which satisfies those who devote themselves to theology, viz., the knowledge of realities - Facts and Principles – united to a perfect familiarity with Letters and the art of expression. Now this combination we find in Lactantius, in Augustine, or in Jerome; ...' (*ibid.*, pp. 123-124.) The Fathers are the types of the *doctus orator*, the statesmen of Cicero.

5 Samuel Daniel's summing up of the ways in which the increasing commercialization of society enhanced the educational avenues to power, is excellent: 'A time not of that virilitie as the former, but more subtile, and let out into wider motions ... A time wherein began a greater improvement of the soveraigntie, and more came to be effected by wit then the sword: Equal and just incounters, of State and State in forces, and of Prince and Prince in sufficiencie. The opening of a new world, which strangely altered the manner of this ... by the induction of infinite Treasure, and opened a wider way to corruption, whereby Princes got much without their swords. ... Leidger Ambassadors first imployed abroad for intelligences, Common Banks erected, to return and furnish moneys for these businesses. Besides strange alterations in the State Ecclesiasticall: religion brought forth to bee an Actor in the greatest Designs of Ambition and Faction.' (*The Complete Works in Verse and Prose of Samuel Daniel.* Edited, with memorial introduction and a glossarial index embracing notes and illustrations. By the Rev. Alexander B. Grosart. London: Aylesbury, 1895-96. Vol. 4, p. 77) It was in this world that scholars and schoolmasters came to assume the functions of civil prudence. Ruth Kelso points out that in the sixteenth century: 'Of all professions, then, the fittest for gentlemen and those aspiring to become gentlemen was the law.' (*op. cit.*, p. 51) This was basically Ciceronian. The difficulties encountered in extending the Ciceronian ideal of the learned statesman to the feudal aristocracy are evident in many arguments urged against those who held that studies are effeminate. See Elyot's *Governour* (London: J. M. Dent & Co.; New York: E. P. Dutton & Co., 1907. Everyman ed.

by Ernest Rhys, pp. 49 ff.) and Spenser's *Tears of the Muses*, 11.79-90, and Roger Ascham's *Scholemaster*, ed. J. E. B. Mayor, London, 1934, p. 40.

6 L. K. Born 'The Perfect Prince' in *Speculum* III (1928), p. 470.

7 See J. Maritain's *True Humanism*, New York, 1938, pp. 95-96; 147 ff.; 208; 220. J. Allen shows how Marsilio of Padua states Machiavelli's and Hobbes' theory of the state long before them (*Great Medieval Thinkers*, ed. F. J. C. Hearnshaw, London, 1921; pp. 176-177.) Significantly, too, Wycliffe anticipates the same theories (pp. 217 ff.)

8 See H. Butterfield's *The Statecraft of Machiavelli*, London, 1940.

9 The obvious parallels between Hamlet and Castiglione have been indicated by W. B. D. Henderson in 'A Note on Castiglione and English Literature,' in the Everyman edition of Hoby's translation. (London: J. M. Dent & Co., 1928, pp. xi-xiv) Ascham highly approved Castiglione (*Scholemaster*, ed. Mayor, p. 119). In *The Advancement of Learning* Bacon significantly conjoins the concept of the ideal courtier to that of prince and orator: 'But as Cicero, when he setteth down an idea of a perfect orator, doth not mean that every pleader should be such; and so likewise, when a prince or a courtier hath been described by such as have handled those subjects, the mould hath used to be made according to the perfection of the art ...' (New York: E. P. Dutton & Co., London: J. M. Dent & Co., 1915. Edited by G. W. Kitchin, p. 203)

One of the most emphatic testimonies to the recognition of the function of the prince in uniting wisdom and eloquence is the *Papyrus Geminus*, published at Cambridge in 1522 as *Eleatis Hermathena seu de eloquentia victoria*, an entertainment in which Eloquence, Wisdom's child, with the help of Caesar, Cicero, and Servius Sulpicius, pleading in the Elysian fields for the release of her mother Wisdom, long kept in bondage by her enemies, nobles, women, sophists, and lawyers, wins a truce. Eloquence brings Wisdom to England where she is welcomed by Henry VIII and admired by the people. Henry, quite as much as James I, was a scholar-prince.

10 Everyman, p. 13. Cicero's basic insistence that the orator be a versatile or encyclopedic amateur blended into Castiglione's major condition for the Courtier that he 'eschue as much as a man may, and as a sharpe and dangerous rocke, too much curiousnesse and affectation and (to speake a new word) to use in everything a certain disgracing to cover art withall, and seem whatsoever he doth and saith, to doe it without paine, and (as it were) not minding it' (p. 46). The habits of understatement and of easy nonchalance about one's attainments were incorporated in the gentlemanly code of the sixteenth century, thanks to Cicero. See Hamlet's

> I'll be your foil, Laertes. In mine ignorance
> Your skill shall, like a star i' the darkest night
> Stick fiery off indeed. (V, ii, 255-257.)

Compare Hamlet's speech to the players with Castiglione pp. 56-57. Compare his jests with p. 58. Compare his cautious fearfulness in accusing Claudius with p. 171. It is part of the civil prudence of an ideal prince. It is also noteworthy that the full rhetorical doctrine of decorum enters the sphere of courtly manners, so that rhetorical and social decorum are identical: "... we have given the Courtier a knowledge in so many things, that hee may well varie his conversation, and frame himselfe according to the inclination of them he accompanieth himselfe withall ...' (p. 121). It was conceived that one function of the aristocratic governor was 'to maintain civil obedience by gaining the good will of the lower classes to the upper.' Kelso, *op. cit.*, p. 88.

11 Ruth Kelso deals with these, pp. 118 ff. Lyly's *Euphues* is, of course, prominent in the list. She doesn't include Brinsley's *Ludus Literarius*, whose advice on theme writing is pointed up with reference to the Ciceronian ends of education: 'The principal end of making Theams, I take to be this, to furnish schollers with all store of the choicest matter, that they may thereby learn to understand, speak or write of any ordinary theame, Morale or Politicall, such as usually fall into discourse amongst men and in practice of life; and especially concerning virtues and vices' (Campagnac's reprint, London, 1917, p. 172).

Early Science and the Printed Book: The Spread of Science Beyond the Universities

Stillman Drake

The history of science as a separate branch of cultural and intellectual history is not very old; not much older than the concept of the Renaissance itself. That concept, though it has been subjected to attack in recent years, is particularly applicable to the study of history of science, at least in its strictest and most literal sense of a rebirth. In my opinion this is best seen in relation to the advent of the printed book, and the picture of this relation that I wish to put before you can best be introduced by a brief statement about the case of physical science, to which my remarks will in any case be essentially limited.

Physical science has a special relation to mathematics. Now, there is a sense in which mathematics is the only subject in which antiquity possessed exact knowledge of permanent value that had become lost to the official scholarship of the Latin West long before the invention of printing. Obviously I do not mean to say that all knowledge of ancient mathematics had been lost. Clearly it had not; the case of Euclid makes that clear. But there were important segments of ancient mathematics that were capable of altering the whole face of physical science that had long dropped from sight. Moreover, the standard medieval Latin translation of Euclid and the commentary that accompanied it had failed to give a correct account of ancient refinements in at least one fundamental branch of mathematics, the theory of proportion. A study of medieval mathematics has convinced me that certain ingenious substitutes for the classic theory of proportion had made it most unlikely that that would be again hit upon in any way other than by the restoration and study of old texts, a specific activity associated with the concept of the Renaissance.

As to debates in our time over the validity of the Renaissance concept, these appear to me to have been conducted in a particularly unfruitful manner. It is obviously useful for historians to have a descriptive name for a period that was characteristically neither medieval nor modern. The fact that no precise date can be set for the beginning and end of such a period in general does not destroy the utility of the concept. In any branch of intellectual and cultural history, specialists can define a Renaissance period according to criteria appropriate in that field, and those criteria will then serve also to clarify the meanings of 'medieval' and 'modern' with respect to its development. An overlapping of periods defined in that way, by a variety of specialists in many fields, enables us to say something about the general state of culture within any particular range of dates. This seems to me a perfectly defensible way of going about our business as historians.

Generally, when the Renaissance concept is attacked, that is done not on the basis of utility but on grounds of propriety. Should we use one word, 'Renaissance,' to denote a wide variety of periods? Confronted with this question, excessively scrupulous historians tend to disparage the word as a name for something that had no clear existence, and to disown the concept as a capricious nineteenth-century creation corresponding to no demonstrated historical facts. Hardier souls have in effect adopted in its defence the position of Humpty Dumpty; at any rate, they seem to me to have said little more than 'when I use a word, it means whatever I want it to mean, nothing more and nothing less.'

The proper procedure, it seems to me, would be not to engage in ethical disputes over the

right to coin words, or in ontological disputes over the existence or non-existence of historical patterns, nor yet to support uncritically the right of everyone to use any word, especially a term of art, in any manner he pleases. Rather, we might better make clear the criteria by which words like 'medieval,' 'Renaissance' and 'modern' are to be applied in a designated area, and then go boldly ahead and apply them, to see whether the patterns of historical fact that thus emerge are interesting, or instructive, or of heuristic value. If in some fields they are not, or if it is impossible to make the criteria clear, then not only the word 'Renaissance' but also the word 'medieval' should probably be abandoned in those fields, but without prejudice to the terms themselves; though in such cases there is not much point in retaining the word 'modern,' either, unless that is to be contrasted with 'ancient.' For however hard it may be to define a period between medieval and modern ideas and activities in a given cultural field, it must be still more difficult to fix a date in that field on which medieval ideas and pursuits went out of date and were replaced by modern ones. Hence it seems to me that wherever we can agree to retain the word 'medieval,' we are likely to find the Renaissance concept also useful.

Now, the history of science is very definitely one field in which both terms are useful. As I have said, the word Renaissance is particularly apt, in its most literal sense, when applied to one of the main developments in sixteenth-century physical science. It was then that ancient Greek mathematical and scientific works were rediscovered that had been unknown to, or utterly neglected by, medieval writers. Correct texts were established, proper translations were made, and appropriate commentaries were written also for other ancient works that had previously been known only in part or only in corrupt versions. Now, the rectification of mathematical texts has an essentially different role from that of the restoration of authentic literary or philosophical works, the interest of the latter being mainly, if not entirely, antiquarian in character. But the works of Euclid, Archimedes, Apollonius of Perga and Pappus of Alexandria were replete not with ancient opinions, but with extremely valuable knowledge, most of it as valid in the sixteenth century, and today, as when it was written. It is at least open to question whether the retrieval of the authentic texts of Plato and Aristotle represented anything like the same acquisition of permanently valuable knowledge, putting antiquarian interest aside, as those of Archimedes. Indeed, a defective philosophical text could easily be more inspiring than a correct one, through what Aldous Huxley called 'lapses into lucidity.'

In any case, the restoration of classical mathematics in the sixteenth century did make possible some immediate scientific advances that would have required a great deal of time to achieve in any other way. Given unprecedentedly wide circulation in printed books, it had a direct and far-reaching effect on both the form and content of physical science. This was a true rebirth of ancient scientific knowledge, most aptly described by the word 'Renaissance.' If there had been no Renaissance, historians of science would have had to invent it.

Immediately preceding this, and therefore independently of it, a reawakening of interest had begun in direct inquiries into particular phenomena, as against the speculative assignment of causes to things that characterized medieval science. The most prominent representatives of this aspect of Renaissance science are well known – Leonardo, Copernicus, Paracelsus and Vesalius. Indeed, an exaggerated attention paid to a few such men has rendered the phrases 'Renaissance mechanics,' 'Renaissance astronomy,' 'Renaissance chem-

istry' and 'Renaissance anatomy' significant of little more to most people than the work of those four men respectively. Even among historians of science generally, the adjective 'Renaissance' seldom carries with it the kind of thematic characterization that accompanies the words 'ancient,' 'medieval,' and 'modern,' when applied to specific scientific disciplines. Yet Renaissance physics, at least, does have a character of its own – or rather a split personality – that has escaped notice for rather interesting reasons.

The first historians of science naturally relied almost exclusively on printed books as their sources of information. Now, very few medieval works of recognizably scientific interest ever passed into book form, whereas most of the ancient scientific works known in the sixteenth century, as I have already mentioned, were widely circulated then for the first time. Hence medieval science tended to be overlooked by early historians. Until quite recent times, the period from the close of the Alexandrian era to the opening of the sixteenth century was dismissed as of no historical importance for the exact sciences. Thus the question of a special character for Renaissance science did not immediately arise; the 16th century was simply regarded as the initial stage of modern science, inspired by ancient models.

That view, associated with the name of William Whewell and the 19th century, could no longer be maintained after Charles Thurot and Pierre Duhem turned at the end of that century to the serious examination of medieval manuscripts. In particular, Duhem brought to light a conscious program of applying mathematics to physics in writings of the 13th and 14th centuries. Since Galileo and Descartes in the 17th century mathematicized physics, Duhem assumed a line of transmission from the Middle Ages through the Renaissance to the pioneers of modern science. The assumption is so plausible that it pervades history of science today, though still undocumented through printed books. Thus again the question of a special character for Renaissance science was slighted off, and the sixteenth century was regarded as merely a period of transmission of much older works, medieval as well as ancient.

From this it is evident that the study of printed books as against manuscript sources has always been fundamental to the historiographical question of Renaissance science. That being the case, one might expect the differences as well as the resemblances between books and their predecessor manuscripts to have been brought to the fore and carefully analyzed. But the advent of the printed book seems instead to have been treated by historians of science, and perhaps by other intellectual historians, not as a fundamentally important event, but as a mere replacement of the scriptoria by printing-houses. This seems to me as absurd as if social historians in the future were to regard the replacement of the horse by the automobile as having introduced no fundamental change. Transportation was made faster and more generally used, but that is not all. The printed book made it easier for a scholar to acquaint himself with the work of other scholars, and if that had been all it did, it might reasonably be regarded as relatively unimportant. The nature of scholarship would not have been affected, but only its rate of progress. But in science, at least, printed books *did* change the nature of scholarship. When we recognize that fact, we also see that the older historical view of Renaissance science was not entirely wrong, nor is the view that has replaced it entirely right.

The printed book changed the nature of scholarship by effecting a fundamental alteration in the composition of the world of learning. Perhaps this is more evident, as it is cer-

tainly more significant, in mathematics and physical science than anywhere else. The point may be illustrated by naming half a dozen medieval writers whose works are now recognized as of paramount importance in the history of physical science, and seeking their counterparts in the sixteenth century. The medieval writers that occur to me are Jordanus Nemorarius, Robert Grosseteste, Thomas Bradwardine, Jean Buridan, Albert of Saxony and Nicole Oresme. Of these men, all but Jordanus were certainly university teachers, and even Jordanus, a shadowy figure, is known to have composed at least one work specifically for university instruction. Physical science through the sixteenth century may be represented by Leonardo, Niccolò Tartaglia, Girolamo Cardano, Giovanni Battista Benedetti, Guidobaldo del Monte and Simon Stevin. Of these men, only Cardano taught in a university, and his contributions to physics are the least important of any man in the list. It is safe to say that during the Middle Ages, physical science was a university monopoly, whereas after the printed book it was far from being so.

Obviously other lists could be drawn up, and perhaps my last statement could be shown to be an exaggeration. But the basic idea contained in it would not be changed. It may be debated whether purely technical treatises on the one hand, and purely philosophical discussions of physics on the other hand, should or should not be included in the lists. I believe the result will be pretty much the same, so long as the criterion is the same for both periods. If spokesmen for medieval continuity in science should produce a list to show that medieval science was not a university monopoly, I think they would find that in that list the unity of medieval science – that special character by which they recognize it in later periods – will have slipped from their grasp. That may be precisely what some of them desire, but in that case they are merely asking us to abandon a valuable working concept in intellectual history when they question the idea of a Renaissance.

The change in composition of scientific scholarship that followed the advent of the printed book consisted essentially in the addition of self-educated men and talented amateurs of liberal education to the ranks of those who made substantial contributions to science. Their actual contributions differed in an essential way from those that continued to be made by official scholarship; that is, university professors. I shall illustrate the difference presently, but first I wish to speak of the half-century lag between the invention of printing and the effect on physical science that I attribute to the printed book. Obviously the invention itself could not produce the effect immediately. First it was necessary that books having some relevance to science appear, which brings us to about 1480. Mathematics was especially relevant to the effect in physics, and so far as geometry is concerned the crucial date is 1482; for algebra, it is 1494. By 1500, wide and relatively inexpensive production of books had become a reality throughout Europe, which means that the process of self-education and the discovery by amateurs of their own particular talents in fields previously unfamiliar to them had begun. The number of such persons in the general population was certainly very large as compared with the university population; but not everyone, even in the universities, was destined to make a lasting contribution to his field. The half-century lag between the invention of printing and the appearance of significant scientific books written by men outside the universities is therefore no reason for denying an intimate connection between the two events.

A rapid multiplication of treatises on scientific topics took place after 1500 that contrasts with the relatively even production of manuscripts on such subject in preceding centuries. This phenomenon probably owes a good deal to the difference between the printer

and the professional scribe whose work he forced into obsolescence. The scribe generally copied only those works he was commissioned to copy, and his methods of work were unrelated to the contents of his manuscripts. The situation of the early printer was different. Although some books were printed to order or by commission, for the most part they were commercial ventures attended with risk and involving considerable capital. That printers took risks in such untested markets as physical science suggests a special interest on their part. Printers were concerned with the lever and the screw as essential devices of their art. They were also concerned with alloys of metals and methods of working them with tools, with the composition of inks and the properties of paper, and with other technical problems in a way in which the scribe had not been concerned at all. It is therefore not surprising if some printers took both a practical and a theoretical interest in mechanical principles and devices, as well as in commercial arithmetic and the geometry of design, so that books dealing with mechanics, mathematics, chemistry or metallurgy appeared to them likely to find a market among men who had similar interests.

In some instances, scientific pioneers were themselves printers. Rudolf Hirsch remarked, in a recent book on printing and reading, that printers generally relied on advisers in selecting titles, and went on to remark that: "The earliest event in 'new science' was an exception: Regiomontanus printed in Nurnberg between 1472 and 1476 writings of his teacher, Georg Peurbach, and his own, which according to well-informed critics heralded the beginning of modern astronomy and mathematics. Printers and publishers especially of the 16th century seem to have been quite willing to produce contemporary works which contained novel theories or presented the results of investigations in a new way; they would not have done so unless they could sell these products successfully." Professor Hirsch's remark about novelties here has particular significance with respect to the role of university science vis-a-vis the new science typical of the sixteenth century, of which I shall speak presently. In the 16th century, universities were conservative institutions, whether or not they still are today. Their job was to preserve learning, examine it critically, and impart it; not to seek or create new knowledge, or at least not that primarily. Printers of books also served that purpose, but did not confine themselves to it. Their first productions were heavily weighted in the direction of classical texts and learned commentaries, for most of their assured markets lay in the universities and among the clergy. But in seeking *new* markets, in which the competition would be less direct, they did welcome writers for whose works they could claim novelty, and this was of no small assistance to the spread of unconventional science.

In saying that the age-old university monopoly on science was broken in the sixteenth century, as a direct result of printed books, I do not mean that science passed out of the universities and into the hands of other men. Rather, there were now two streams of scientific thought where before there had been but one. Professors of philosophy continued to write on physics throughout the sixteenth century, and well into the seventeenth, in the same style and with the same objectives as their medieval and early Renaissance predecessors. Fashions changed in the particular topics on which they wrote, but physics remained in their domain so far as official science was concerned. Indeed, they were the men who first attacked the new physics of Galileo in the seventeenth century, long before the Church became concerned about his views. He himself remarked in his *Dialogue,* written after a lifetime of experience, that philosophers would never be swayed by 'one or two of us who bluster a bit.'

Thus one phase of Renaissance science was quite literally a continuation of medieval

science. Centered in the universities, this phase remained Aristotelian to the core, and defined science as the knowledge of things through their causes. It was also influential outside the universities; even Descartes was to criticize Galileo's science on the basis that by trying to investigate particular motions without first determining the cause of motion, he had built without foundation. But the continued existence of official science, and even its spread beyond the universities through the printed book, does not give Renaissance science the unity that had existed in medieval science. There is no getting around the independent origin of a totally different set of inquiries outside the universities. It is this non-U science, to use Miss Mitford's apt term, that is really a distinctive Renaissance entity, and in my opinion it could not have come into and remained in existence before the printed book. I can think of nothing that could have kept such inquiries alive and separate from the centers of learning except its inexpensive and widespread circulation in durable form.

The medieval university community was clearly relatively small and homogeneous as compared with the rest of society in the Middle Ages. A large number of copies of any given work was never necessary within that community, whether we think of this as a single university, of several universities in a geographical area, or even as all the universities in Europe. It was unlikely that a person living in the university community would long remain unaware of the existence of a significant work related to his particular interests. If a copy was not immediately at hand, it was probable that the scholar who told him of the existence of the work would also be able to outline the nature of its contents. But outside the university community, this situation was reversed. It was there highly unlikely that a person would know of all the works in manuscript pertaining to his particular interests. If told of the existence of such works, it was improbable that his informant could also tell him the nature of their contents. For these and similar reasons, the invention of printing was potentially much more important to society outside the universities than to men within them. In a large and heterogeneous community there is never any lack of special talents or of varied interests, but there is always the problem of keeping alive from one generation to the next the fruits of any application of a particular talent to the appropriate interest. Before printing, this problem found no practicable solution.

These and similar considerations of statistical probability seem to me sufficient to account for the relative absence of non-U science up to the closing years of the fifteenth century, and for its swift emergence thereafter. In every period, excellent contributions to knowledge may have been made by men outside the official world of scholarship. Before printing, however, their contributions would be expected to languish unless noticed by a member of the learned community. Those so noticed would be brought into the official stream of science. A manuscript not thus brought into the main stream, either for lack of merit or lack of notice, would be most unlikely to fall under the eyes of another non-U person (outside the scholarly world) who would be interested in it and capable of appreciating it. The probability was always that a work would be either lost, or incorporated into the main body of doctrine. It is in these terms that I should account for both the unity of medieval science and the university monopoly on science before the printed book.

The conservative character of the university in the sixteenth century is further attested to by a curious fact that seems not to have been mentioned by others, if it is indeed a fact. Not only does it appear that meritorious scientific ideas propounded in sixteenth-century books by authors outside the universities aroused no interest or attention inside their walls,

but even the new editions and translations of classic Greek mathematics were not incorporated in university studies, so far as I have been able to discern. It is well known that the astronomy of Copernicus was not taken up by the universities generally. The one exception known to me is Tübingen, where Kepler's teacher, Michael Maestlin, was favourable to Copernicus; but even in this instance he seems not to have gone further than to teach it together with the Ptolemaic and Tychonic systems. The same thing seems to be true of new ideas in mechanics published by Tartaglia, Guidobaldo and Benedetti. Their books appeared in more than one edition, and some of them in more than one language during the sixteenth century, but I have not yet found their ideas taken up in any book published by a professor of the period. On the other hand, each of these non-university men mentions the work of the others who had written before him, either critically or approvingly. Multiple editions and cross-referrals show that a viable body of mechanical science existed that simply did not impress the university community. Two or three professors of mathematics at the University of Padua in the sixteenth century did lecture on mechanics, but only as a commentary on the pseudo-Aristotelian work on that subject that had come to light for the first time late in the fifteenth century. So a neglect in university circles of contemporary writers on mechanics cannot be excused on the grounds that this was not a university subject. Rather, it supports the view that the doors of sixteenth-century universities were closed to new scientific ideas from the outside.

It has been mentioned that the theme of official science was the knowledge of things through their causes. In general, that is a different theme from the mathematical description of physical events. Mathematics could not be admitted as a cause of anything under the Aristotelian view, and descriptions failed to disclose causes in the Aristotelian sense. Nevertheless, as Duhem long ago pointed out, medieval philosophers of the 14th century had formulated some ingenious and elaborate methods of introducing mathematics into Aristotelian physics. Some of the best of those medieval works had reappeared in printed books from about 1480 to 1530. Many historians today believe that the same doctrines continued to be discussed in the universities throughout the 16th century, and that Galileo was inspired by them to undertake his own program of mathematicizing physics. The evidence of printers' production seems to me to be against this. The number of such books was greater before 1500 than after, and the medieval treatises in question were not reprinted after 1530. About that time, the universities (except Paris) seem to have taken a greater interest in going back to pre-medieval commentaries on Aristotle, of which a great number were printed and reprinted from about 1525 on into the seventeenth century. More important from the standpoint of science is the popularity of debates on method in sixteenth-century universities, particularly in Italy. The certainty of mathematical knowledge was a topic explored by several prominent philosophers inside and outside the universities. These debates on method and on mathematical certainty are just now coming to be seen as important to the history of science, in view of the later development of physics. But since the philosophers who wrote on these subjects did not also contribute to scientific knowledge, it is small wonder that they were not recognized by the earliest historians of science.

Critiques of method were also written by anti-Aristotelian philosophers of the late Renaissance; among these we may count Bernardino Telesio, Pierre de la Ramée, and Francis Bacon. It seems to me likely that these critiques would have been made in any case, whether

or not a new astronomy and a new mechanics had been proposed by sixteenth-century scientists, because neither the debates on method and mathematical certainty within the universities nor the anti-Aristotelian programs of other philosophers were based on the idea that new discoveries had to be accommodated, or that new sciences ought to be admitted. Indeed, Bacon was outspoken against the Copernican astronomy, which at that time had made more headway in England than anywhere else, and as I have previously mentioned, Descartes opposed the new sciences of Galileo. The ferment of ideas on method and of opposition to the authority of Aristotle seems to me to be a product of the general broadening of discussion that followed the printed book, rather than a by-product of the new ideas in science itself. The two are linked together by later developments in science, but perhaps not by common interests of the authors who put them forward.

It is time now to turn our attention away from official science, which in effect continued in the universities after the invention of printing much as it had before, but which spread out from them into a more general literature, and to consider the two movements in science that arose outside the universities and that give to Renaissance science its own characteristic content, neither medieval nor modern.

The first of these is the editing, translation, and writing of commentaries on classic Greek mathematical and scientific works. Euclid was of course first in the field, and least removed from the medieval tradition. In fact the first Euclid printed was in the medieval translation (Latin from Arabic) by Campanus of Novara. This was followed in 1505 by the Renaissance translation of Zamberti directly from the Greek. Both were reprinted many times in the sixteenth century, chiefly in France and Italy. The first vernacular translation was into Italian and appeared in 1543, the same year as the great works of Copernicus and Vesalius. An English translation with much improved commentaries was published in 1570; partial French and German translations also belong to the sixteenth century. Vernacular translations put rigorous mathematics into the hands of a much larger population for the first time, while the first really competent mathematical and textual commentary, written by Federico Commandino, set new technical standards. The first mathematical works of Archimedes to be printed came in the first decade of the sixteenth century, followed in 1543 by his two works dealing with physics, and the following year by the Greek text of most of his works and a Renaissance Latin translation. Ptolemy's astronomy was printed in 1515 from an Arabic text; better translations followed, and the Greek text, by mid-century. The mechanical and mathematical works of Hero and Pappus of Alexandria appeared in Latin, and some of them also in Italian. None of these Renaissance translations, so far as I know, was the work of a university professor, though most of them were by men who had been educated in universities. Others were the work of mathematicians and engineers whose efforts seem to have no explanation other than sheer admiration for the mathematical excellence of the works, and a desire to make them accessible to a wide public.

The original work of Renaissance scientists outside the universities cannot be better illustrated than by the case of Niccolò Tartaglia, who was born at Brescia in 1500. His family was very poor, and the death of his father when he was still a young child meant that he had almost no schooling. According to his own account, he had learned only half the alphabet from a writing master when funds for the tutor ran out, and he completed his education alone. Even allowing for some exaggeration in this story, it is evident that Tartaglia was largely self-educated, for his Italian style was anything but cultured, and occasioned derision

from some of his better-educated contemporaries. His only publications in Latin were editions of medieval translations in which he did not venture to make textual corrections. But Tartaglia had a great talent for mathematics, particularly algebra, and when he reached maturity he began to offer private instruction in that field. Instances of self-education to such an extreme degree are not common even in the Renaissance, and it is hard to see how they would even be possible before the existence of printed books.

In 1531, when Tartaglia was tutoring private pupils at Verona, he was asked by an artilleryman how to point a cannon in such a way as to attain the maximum distance for a shot with a given charge. This problem he solved correctly, and then became interested in the possibility of working out a general mathematical treatment of projectile paths. Having done this to his own satisfaction, he says that he decided not to publish it because it would be sinful to teach Christians how better to slaughter one another. However, when the Turks threatened Venice in 1537, he overcame his scruples and published it in a book called *Nova Scientia,* written in Italian, dedicated to a military commander, and intended for the practical use of soldiers.

This is the first book I know of that proclaims novelty of a science as a recommendation. Such titles were not uncommon thereafter, as in his rival Girolamo Cardano's *Opus novum de proportionibus* and Galileo's *Due nuove scienze.* Tartaglia's new science of ballistics was presented in mathematical form, with definitions, axioms, postulates and theorems. So far as I can tell, it is devoid of influence by medieval physics; its principles are drawn from Aristotle and Euclid and its form is neither syllogistic nor argumentative, but that of mathematical deduction. Perhaps the work of Archimedes on floating bodies suggested the pattern to him. Several traits of this first significant attempt at a new physics strike me as characteristic of the age: use of the vernacular, stress on practical utility in the dedication, pride in novelty, and the stress on mathematical rigour in scientific argument.

This first book of Tartaglia's went through half a dozen Italian editions during the sixteenth century and was translated into German and English. Its results were adopted by many writers on military matters, who continued to cite it in the 17th century even after Galileo's correct theoretical analysis of projectile motions, which was not of practicable application to gunnery. But despite this widespread acceptance, I have never run across any reference to Tartaglia's theory that would connect it with any university course, or any citation of it by a professor writing on motion or on physics.

Tartaglia published the first vernacular translation of Euclid in 1543, working from the Latin of Campanus and Zamberti, whose commentaries he also translated, adding further commentaries of his own which contain some interesting textual conjectures. He probably had very little knowledge of Greek, and seems not to have consulted manuscript sources. In the same year he published some medieval Latin translations of works by Archimedes, including the two which dealt with mathematical physics. All these works are of interest in their departure from ordinary scholarly practices. No professor would have bothered to make a vernacular translation, and still less to publish uncritically a Latin translation from the Greek. Tartaglia's motivation can hardly have been anything other than zeal to provide for others an easier road to self-education than that which he himself had followed.

In 1546 he published his second original work, a collection of scientific questions with which he had dealt in his tutoring. In his book he made what was perhaps the first open challenge to the scientific authority of Aristotle, directed against the treatment of certain problems related to the balance. As a remedy to this he published in Italian an improved

version of the medieval science of statics due to Jordanus Nemorarius. In 1551 he followed this with a treatise on the raising of sunken ships, accompanying it with an Italian translation of and explanatory commentary on the work of Archimedes on floating bodies. With this publication, Tartaglia had set forth in Italian virtually everything of importance that the past had to offer on theoretical mechanics, whether ancient or medieval, and had contributed a good bit of his own. His final work was a vast treatise on mathematics, most of which was published posthumously about the time Galileo was born.

Tartaglia's publications, and a certain notoriety he had obtained as a mathematician by winning challenge contests and by a celebrated dispute with Cardano, failed to win for him any university chair in mathematics, though he made at least one serious attempt to obtain one. He was certainly a much better mathematician than the incumbent at Padua, Catena, who is remembered mostly for his mystical interpretations of mathematics. It is clear, however, that Tartaglia's work had a wider effect, and did more good for science, than it was likely to have done from within a university. He enormously widened the access of Italian readers in every walk of life to mathematics and its application to practical problems. One of his private pupils was Benedetti, who was in many ways Galileo's most important Italian predecessor, and another of his pupils is supposed to have been Ostilio Ricci, Galileo's own teacher of mathematics and also unconnected with a university.

As I remarked, Tartaglia affords a striking illustration of the things that distinguish Renaissance from medieval science, but he is not thereby typical of it. Many important contributors to Renaissance science through original works, translations of classic mathematics, or scientific commentaries were university-educated men who did not remain to teach. Such men were Commandino, Guidobaldo, and Bernardino Baldi. In England they had counterparts in Robert Recorde, Thomas Digges, Henry Billingsley and Thomas Harriot; in Switzerland, Walter Ryff and Michael Varro; in Holland, Simon Stevin. In France, no second stream of science outside the universities seems to have flourished, perhaps because the University of Paris continued much longer than other universities to pursue the medieval tradition that linked mathematics to physics. Possibly there is also a connection with the fact that printing in Paris was much more closely linked to the University than in any other city.

If in conclusion I were to try to characterize Renaissance physical science, I should say that it was the period during which the unity of science was lost by its passage outside the universities, a period that opened with the inexpensive printed book and that closed with the work of Galileo, which re-established a unity of science that depended not on its institutionalization, as it had in the Middle Ages, but on its removal from the tyranny of any authority other than those of mathematics and of nature herself.

The Collected Works of Erasmus

R. J. Schoeck

Toronto has long been the centre for Renaissance Studies in Canada – indeed, one of the two or three centres in North America – and this edition of Erasmus has come into being as a natural product of that strength, galvanized by the initiative of the University of Toronto Press. It occurs at a time when J. K. McConica, D. F. S. Thomson and R. J. Schoeck were together on the University of Toronto campus, with Wallace K. Ferguson nearby at Western Ontario; these four, and Peter Bietenholz at Saskatchewan and Sir Roger Mynors of Oxford, comprise the central group of scholars in the project.

The *Collected Works of Erasmus* will make Erasmus available in accurate and readable English, in a well-annotated, scholarly form. For the correspondence, the text will be that of the Allen edition, *Opus Epistolarum,* translated by Sir Roger Mynors and D. F. S. Thomson. For Erasmus' other works, which will appear concurrently with the volumes of correspondence, the Latin text chosen will be the one which, in the judgment of the editors, is the definitive one; the editing and translating will be in the hands of scholars in North America and Europe.

Volumes in the *CWE* will include introductory essays, critical notes, relevant biographical and bibliographical material, and indexes, as appropriate.

It would be well to begin with the structure of the Edition and to look at the Editorial and Executive Committees.

Editorial Committee:

Literary Co-Editors:	Historical Co-Editors:	Co-ordinating Editor:
D. F. S. Thomson (Toronto)	J. K. McConica (Toronto)	R. J. Schoeck (Toronto)
Sir Roger Mynors (Oxford)	W. K. Ferguson (Western Ont.)	Chairman

It will be the responsibility of the Literary Editors to create an 'accurate and felicitous text' of Erasmus in English. The Historical Editors will primarily be concerned with presenting Erasmus and interpreting his writings historically; theirs will be the responsibility for introductions, annotations, biographical registers, etc. The Co-ordinating Editor – in cooperation with the literary and historical editors, and with the Executive Committee – organizes and coordinates the workflow of individual volumes and the planning of the project as a whole.

Executive Committee:

This committee is comprised of scholars and members of the University of Toronto Press and is responsible for bringing the work of the above editors into being; it will be actively involved in the long-range planning of the project as a whole. As Chairman of the Executive Committee, the Coordinating Editor will maintain liaison between it and the editors.

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As I have commented (in an article on 'Group Scholarship' in the *ACLS Newsletter,* November 1969), we have designed this structure to place research and editorial responsibilities with scholars who are responsible for the text and apparatus, and long-range planning and publication with an executive committee that will have full representation of the Press – with, obviously, an interlocking membership to ensure the fullest communication and liaison (reinforced by the feature of having the Co-ordinating Editor function as chairman of both committees).

Advisory Committee:

We have already drawn upon advisors for counsel and guidance, and we plan to continue – indeed, we are looking forward to a meeting of all members of the Editorial, Executive and Advisory Committees here in Toronto during 1971. The names of members of the Advisory Committee are as follows:

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Université de Laval, Québec;

Sylvester, R. S.
Yale Edition of the Works of St. Thomas More;

Thompson, Craig R.
Professor of English, University of Pennsylvania;

Trapp, J. B.
The Warburg Institute, London.

Arrangement of Volumes

The *CWE* will comprise about 35 volumes, consisting of Correspondence (15 volumes) and other writings (20 volumes). It is expected that the second group will be arranged thematically more or less as follows:

Erasmus and the Classical Tradition (including his writings on rhetoric, eloquence, and education (largely in vol. I of the *Opera Omnia,* Leiden ed., plus the Apothegmata in vol. IV)

Literary Works [volume editor: R. J. Schoeck]
(*Moriae Encomion, Iulius Exclusus, Querela Pacis, Institutio principis Christini, Panegyricus, Declamatio, Oratio funebris* ... and *Oratio de pace,* and the Poems)

Adagia [volume editor: M. M. Phillips]

Erasmus and the New Testament (including the Paraphrases) [M. A. Screech]

Erasmus and the Church Fathers [volume editor: S. Greenslade]

Erasmus and the *Philosophia Christi* (*Enchiridion,* Commentaries on the Psalms)

Erasmus and *Pastoralia* [volume editor: L. Boyle]
(on religious instruction, the methods of confessing, preaching and praying)

Erasmus and Spirituality
(works on religious inspiration, sermons, prayers)

The Pre-Reformation Controversies of Erasmus

Controversies with the Reformers [volume editor: J. Pelikan]

Controversies with Catholic Theologians after 1521

The Colloquies

A final volume of index and bibliography

Finally, a word on progress. If the year 1968-69 was a year of consultation, 1969-70 has been a year of planning. We have gathered the nucleus of our working scholars and are in the process of making assignments both of volumes to volume editors (whose responsibilities may range from a total supervision of the volume as a whole to the writing only of the introductory essay); we are now looking forward to the assignment of individual works within those volumes which will have a relatively high priority. For the correspondence, the Editorial Committee is now planning the publication of several volumes together (probably to carry Erasmus' correspondence through the year 1520), a multi-volume launch which will include a General Introduction (both literary and historical), biographical registers, appendices, and index. Professors Mynors and Thomson have already begun the work of translation. For the other writings, the Editorial Committee is at present completing the provisional groupings into volumes and the assignment of volume editors. Individual scholars are encouraged to write the Coordinating Editor both to ask for further details and to provide information concerning their own work in progress.

Notes and Comments

THIS ISSUE was designed by Peter Dorn of the University of Toronto Press. Mr Dorn has won numerous national and international awards including those given by the American Institute of Graphic Arts for the 50 Best Books of 1969 and by the American Association of University Presses for the 25 Best Books of 1969.

OUR NEW POLICY re articles: Subscribers and prospective subscribers are invited to submit articles to the editor for consideration and possible publication in the Bulletin which in this issue features contributions by outstanding scholars at the University of Toronto. Articles should be limited to 3000-4000 words in length and conform to the revised edition of the MLA Style Sheet. The Bulletin will continue to publish bibliographies and other material of documentary interest as in the past. Plans are under way for a book review section which will soon be introduced.

ON FRIDAY, MARCH 20 Professor H. S. Noce (Italian & Hispanic Studies) gave a talk to the Toronto Renaissance and Reformation Colloquium on the *Dialoghi in lingua rustica* by Angelo Beolco, known as Il Ruzzante (1502?-42), as a prologue to a presentation of the *Bilora* (in a new translation) by students of the Drama Centre.

IN HIS REPORT to the North Central Conference of the Renaissance Society of America, held May 21-23, 1970 at the University of Guelph, Professor F. D. Hoeniger, Corresponding Secretary, announced that in 1971 the meeting would be at Canisius College, Buffalo, on April 21-24, and in 1972, in London at the University of Western Ontario. Professor Hoeniger reported that a Renaissance Centre under the direction of Professor de Bujanda had been established at Sherbrooke, Quebec. He also spoke of the Milton collection at the University of Western Ontario and the Edmund Spenser Newsletter edited there by Professor A. K. Hieatt. The annual international conference in July on Shakespeare and Elizabethan Theatre, now in its second year at the University of Waterloo, with G. R. Hibbard as the new director, was announced.

A NOTE IN the University of Toronto Graduate Studies Calendar for 1970-71 reads: 'It is hoped that degree programs in Renaissance Studies can be offered in the 1971-72 session. The establishment of a Centre to conduct an inter-disciplinary program in the period of the Renaissance is under active consideration. Meanwhile it is possible to arrange a program for individual students involving more than one department, but leading to a degree in one of them. Enquiries should be addressed to the Secretary of the School of Graduate Studies.'

AMONG THE PH.D. THESES completed during 1969-70 of Renaissance interest were: William K. H. Dean, *Form and Function of Comedy in English Drama, 1400-1612*; J. C. Nohrnberg, 'A Study of the *Faerie Queene*; G. B. Shand, *Stage Technique in the Plays of Christopher Marlowe;* and Eleanor P. Vicari, *Learning and Imagination in Robert Burton* (all in English); Walter J. Temelini, *Life and Works of Bernardino Pino da Cagli*; and Olga Pugliese, *The Nature and Place of Religion in the Works of Girolamo Benivieni* (both in Italian); Marcella McCann Grendler, *The Trattato Politico-Morale of Giovanni Cavalcanti (1381-1450): A Critical Edition and Interpretation* (History); John Chamberlin, *Medieval Arts of Discourse and the Development of Scriptural Figures in Donne's Sermons* (Medieval Studies).

THE OFFICERS OF the Toronto Renaissance and Reformation Colloquium for 1970-71 are: Chairman: Stillman Drake (History & Philosophy of Science & Technology); Secretary: Mrs. A. M. Patterson (English), Victoria; Treasurer: Leslie McCormick (Italian), Erindale.

CORRECTION: THE AUTHOR of *Corpus Reformatorum Italicorum*, published in R&R VI, 1: 6-7, is Anne Jacobson Schutte, Lawrence University, Wisconsin, and not as erroneously reported.

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